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W. J. JOHNSTON, Editor and Publisher.
T. COMMERFORD MARTIN, JOSEPH WETZLER, Associate Editors.
E. P. THOMPSON, Associate Editor Patent Department.
CLARENCE E. STUMP, Business Manager.

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CONTENTS.

ILLUSTRATED ARTICLES: PAGE.

The Employment of Condensers in Telephony 188
A Liquid Rheostat..... 189
A Constant Dry Battery ... 189
An Electrical Indicator for Steam Vessels..... 190
A New and Simple Burglar Alarm..... 191
Static Electricity..... 191
A Novel Battery Cell 192
Electro-Medical Apparatus. 192

EDITORIAL PARAGRAPHS..... 187

MISCELLANEOUS:

Progress of Incandescent Electric Lighting in the United States..... 188
Fire Alarm and Police Telegraph Wires Under Ground 188
A Canine Messenger Corps.. 188
Sir William Thompson's Electro-Static Volt Meter 189
To Find a Galvanometer Constant 189
Natural Gas and Electric Light..... 189
Mr. Gower's Disappearance 190
Litigation over Stock Tickers 190

MISCELLANEOUS: PAGE.

Economy of Fuel in Electric Lighting 190
Telephone Troubles at Burlington, Vt 192
New Haven's Telephone Capitalists..... 192
Meeting of the New York Electrical Society 192
Remedying a Possible Danger..... 193
The New England Telephone Company..... 193
Postal Telegraph Bonds . 193
New Telegraph Schemes . 193
Success of Incandescent Lighting Companies 193

DEPARTMENTS:

New England Notes 193
Philadelphia Notes..... 193
Pittsburgh Notes..... 194
Western Notes 194
The Telegraph..... 194
The Telephone 194
The Electric Light..... .. 195
Miscellaneous Notes..... 195
Personals... 195
Stock Quotations..... 196
Business Notices..... .. 196
Our Illustrated Record of Electrical Patents 196

New Advertisements.

PAGE.

Novelty Electric Company—Electrical Novelties..... iii
Wanted—Position as Telephone Inspector..... v
Wanted—Situation in Electrical Business v
Wanted—Assistance to Patent Invention..... v
Wanted—Situation with an Electric Manufacturing Company v
Geo. H. Adams & Co.—Dynamo Wanted v
Rhode Island Telephone and Electric Co.—"Little Giant" Battery. v
Shultz Belting Company—Electric Belting..... v
Franklin Electric Works—Private Line Telephone, Supplies, etc.. v
Martin Bros.—Stamp Metal Goods, etc v
Rhode Island Telephone and Electric Co.—Aerial Cable Clips. v
Electrical Development & Mfg. Co.—The Davis Cut-Out v
The Ball Electric Mfg. Co. (Limited)—Arc and Incandescent Electric Lighting..... vi
N. H. Edgerton—The Edgerton Electric Motor vi
A. F Congdon—Electric Appliances vii
Jarvis Engineering Company—Electric Lighting Plants, etc..... viii
United States Electrical Co.—The "Vulcan" Battery Cell..... ix

Vol. VI. NEW YORK, NOVEMBER 7, 1885. No. 19.

WOULD not the Signal Service be better for an investigation, if only to put a stop to all the reports now flying about in regard to it?

WE publish to-day some very interesting notes from an electric light company, descriptive of the manner in which it utilizes natural gas.

THE Western Union Company may have been worsted in the fight for the Stearns duplex, but it thinks it has "a sure thing" in the stock ticker, over which litigation is now resumed.

A PHOTOGRAPH of a streak of lightning is now to be seen in Philadelphia. It was taken by Mr. W. A. Jennings from the roof of his house, and was only "caught" after fifty exposures had been made.

NEW YORK awaits with anxiety the undergrounding of the wires. But the public must be patient. Politics are very interesting to the commissioners just now. Hence the delay, perhaps.

PROF. BELL has been making some sanguine predictions in regard to the time when we shall be able to see people at a distance by means of electricity. And yet, wild as the idea seems to some, who can gainsay him? The invention will be made sooner or later. But it ought to be supplemented by an invention enabling a man to avoid seeing his importunate creditor or anybody else capable of becoming a bore. Mr. Edison is glad to be deaf, and there may occasionally be an advantage in imperfection of the organs of hearing, sight and speech.

WE frequently have occasion to call attention to the renewed practical application of devices long since discarded as obsolete. The Zamboni dry, or, more correctly, moist-battery, which has for a long time been looked upon as hardly more than an electrical curiosity, is now employed by Professor Palmieri as a constant cell, and, as will be seen from an article in another column, the same battery finds a good application in long-distance telephony. These instances, and many others, point to the fact that although old forms of apparatus may be cast aside, their study should be prosecuted not only on account of their historical value, but for the reason that they may at any time be called into active service.

OUR article in another column relating to the use of the condenser in connection with the telephone, suggests the possibilities which this method may accomplish in connection with submarine telephony. This question is one which remains to be solved, and when accomplished, will undoubtedly add to the value of cables, but too great expectations must not be entertained. Considering that at present an Atlantic cable, duplexed, can transmit 40 words per minute and that 150 words per minute is a fair rate of speed of speech, the gain, great as it is, is not so great as some would seem to imagine. Still, if successful, the capacity of a cable would evidently be considerably increased, which would tend to lower cable rates and throw the service open to more general use.

THE national telegraph system of the Mexican Government has not, for many years past, furnished the prompt and efficient service that was desired and that was warranted by the very large expenditures of money in that direction. A careful reorganization of the system has now been begun by the newly-appointed Director General, Señor Don Saturnino Islas, and the good results already apparent indicate the wisdom of the selection of Señor Islas for this important post. He (Señor Islas) is well known to electricians in America, having spent some months here in 1883 examining into new and improved methods in telegraphy and electrics in his capacity as Mexican Telegraph Commissioner. He is a member of the Royal Academy of Electricians and Engineers, and an experienced, skillful electrician.

SOME time ago we were informed that experiments relating to the localization of faults in iron work by means of the needle and of the electric current had been made and proved quite successful. Since that time nothing has been heard of the method, but its apparent effectiveness would seem to entitle it to more extended study. The testing of structural iron, for instance, as made at present, consists for the most part in subjecting a certain per cent. of the samples to a test. If these are found satisfactory, the whole is accepted. This method, however, does not guarantee the integrity of each individual piece, the testing of which would be too tedious and too expensive. Some simple magnetic or electric method, which could be quickly applied, would evidently be a valuable adjunct to the present practice, and would go far toward insuring the safety of the many structures in which iron and steel play such a prominent part.

LAST week we alluded to the trial of Ferdinand Ward, and mentioned the important evidence given relating to the use of the telephone by him and Mr. Fish, when they were conversing about a certain check. It might almost be said that that telephonic conversation, admitted as evidence, served to secure a conviction. The incident attracted attention, and has been referred to by some papers as developing new legal points. This is hardly the case, as earlier instances of telephonic evidence can be found in our pages—one of them, at least, dating back to the fall of 1883. It was singular, however, that during last week bids were made over the telephone at an auction sale in this city, and led to a spirited scene. There was no question as to the genuineness of the bids in this case, but we can imagine circumstances when false bids might very easily be reported, or even might be obtained, from a bogus would-be purchaser at the other end of the line.

ALTHOUGH an acknowledged convenient method of analysis, electrolytic determinations have labored under the alleged disadvantage of unreliability. It is true that a considerable number of the analyses of copper and some other ores is undertaken by this method, but beyond that it has not progressed very far, on account of the reason above given. If we examine the methods employed, it becomes apparent why success has not been attained, as the electrical part of the work is, as a rule, decidedly loose and indefinite. In the majority of cases writers on this subject give no exact measurements and data, but merely record in an off-hand manner that, say, two or three cells were used for the work. It is upon these very details, however, that the success of the analysis depends, and in order that others may apply the process, exact information must be at hand. This means definite measurements of current, resistances and density, electrolytes, etc., where heretofore general rules were followed. When these rules shall be observed we may see many of the purely chemical determinations made according to electro-chemical rules, and continued study in this direction of analysis will, no doubt, lead to improvements of electro-metallurgy on a large scale.

WE were recently called upon to take up the defense of arc lighting against unfair attack, and it will be seen from the correspondence appearing in this issue that an appeal is now made to us in behalf of incandescent lighting. The Pittsburgh Electric Company, whose letters we publish, is engaged, among other things, in putting in electric light plants, both arc and incandescendent, and feels aggrieved that its business interests in the incandescent field should be thus wantonly attacked when the undeniable facts show the assertions made to be utterly without foundation. The inference drawn by the Pittsburgh Company as to the motives that instigated the attack must be accepted by every thinking and fair-minded man as perfectly justifiable. It is a great pity that incandescent and arc lighting, now gaining ground so hopefully and cheeringly, should be abused and decried by the very papers that ought to be the first to assist in making electric lighting a success. The question the Pittsburgh Company asks is: Has a company the right to determine for itself whether or not it is to its advantage to advertise, and, if so, may not it confine its advertising to such journals as it can advertise in profitably? Must it either pay tribute to every scribbler who marks it for its victim, or else submit to be made the subject of scandalous and unfounded attacks? The evil is more prevalent than many believe, but papers resorting to such methods are soon found out, so that what they say has no weight except among those who are unacquainted with their character.

IT is nearly two years since that a novel system of transportation, with electricity as the motive power, was announced. We described and illustrated it at the time. "Telpherage," as it is called, is a system designed for automatically transporting goods by the agency of electricity as the motive power, which system was the invention of the late Prof. Fleeming Jenkin. Dying in June last, however, the Professor did not live to see his ingenious ideas carried out on a practical scale. He had begun the construction of a telpher line at Glynde, near Lewes; but his plans had to be perfected by Professor Perry, his successor as the engineer of the Telpherage Company. This line has been completed, and was formally opened two weeks ago. The use to which the line is put is to carry clay from a pit to the Glynde railway siding, whence it is delivered into trucks and transported by rail to the works of a cement company. At the charging end of the telpher line the skips are loaded each with about two hundredweight of clay, the train thus carrying one ton. A laborer, by touching a key, starts the train, which travels at a speed of from four to five miles an hour along the overhead line to the Glynde station. Arrived there, another laborer upsets each skip as it passes over a railway truck into which the clay is thus loaded. This upsetting, however, will eventually be performed automatically by means of a lever on each skip, which will come in contact with a projecting arm as it passes over the truck. The laborer at the discharging end of the line has full control over the train, and can stop, start and reverse it at will, as can also the man at the other or loading end. There are two trains at Glynde, but only one is at present used, that being found sufficient to deliver 150 tons of clay per week at the station—the minimum quantity required by the cement company. This ingenious system, now practically applied for the first time, was fully described in our issue of May 10, 1884, to which we refer our readers. Its success will pave the way for a more extensive employment of electricity, as the cost of the line is far less than would be required by a surface road of equal capacity. Our mining districts present an excellent field for this method of transportation which our engineers would do well to look into.

Progress of Incandescent Electric Lighting in the United States.

A few numbers ago, we quoted some of the statistics of the growth of the Edison Company's business. An analysis of the last figures compiled, shows in an even more striking manner the rapid advance of the Edison system in popular favor. The figures are given in the minutest detail, so that one can see at a glance the location of the plant, its size, and its function. Making a summary of the various tables, we find that of isolated Edison plants in the country at the present hour, owned and operated by the purchasers themselves, there are no fewer than 520 with 132,875 lamps.

In the *American Electrical Directory* for October, 1884—a publication whose statements may be taken as approximately correct—there appeared a list of isolated plants, showing a total of 451 plants and 97,424 lamps, of which 368 plants and 78,432 lamps were of the Edison system. The company has, however, as above shown, increased its output to 520 plants and 132,875 lamps up to October 1, or an increase, taking this basis, of 41 per cent. on plants and 69 per cent. on lamps. It is also worthy of note here that there are in use 88,000 lamps, additional, in central stations devoted wholly to the work of supplying the public in the same manner as do gas works. Another interesting feature of the work of the company in 1884–5 was the number of installations in exhibitions. The list is as follows: Louisville, 5,000 lamps; St. Louis (permanent), 3,600; New Orleans, 5,000; Cincinnati, 1,200; Boston, 1,200; Milwaukee, 800; Philadelphia, 3,000. No more need be said to demonstrate the success of the company, and the fact that incandescent light has not only come "to stay," but to see other methods of artificial lighting fall into disuse.

The Employment of Condensers in Telephony.

In long-distance telephony, or rather on lines of large electrostatic capacity, the same difficulties are met with as are encountered in submarine telephony. The undulatory currents produced by the microphone charge the cable and arrive very much weakened at the other end of the line. Considerable study has been bestowed upon the means of obviating this serious drawback, and among the results of this experimenting are the two systems described below, which differ entirely from one another. In the first, that of M. Boudet, of Paris, the condenser is only employed as a transformer of the current; the receiver is an ordinary magnetic telephone. In the second, that of M. J. W. Giltay, the transformer is an induction coil and the receiver a condenser.

According to M. Boudet, the condenser, used as a transformer, is the better means of utilizing the static effect of long submarine and underground lines, and probably also of weakening the effects of mutual induction on lines of multiple conductors. M. Boudet started out with the idea of replacing the induction coil usually employed by a condenser, and succeeded by joining to the two armatures of a condenser a third, which is connected to the line: the two other armatures being connected with the two sides of a microphone contact.

This arrangement is shown diagramatically in Fig. 1, for which and the following illustrations we are indebted to our French contemporary, *L'Électricien*. For the sake of simplicity, the microphone is shown with but a single variable contact. The sheets *b* and *c* of the condenser are placed in a shunt on the battery circuit. In addition, the sheet *c* is connected to earth at *T*, and sheet *a* is connected to the line *L*. If a sensitive galvanometer be introduced between the line and earth, it will be observed that when the pressure in the microphone increases, *i. e.*, when the resistance decreases, a current goes in the direction from *T* toward *L*, and consequently in a direction contrary to that of the battery. If, on the other hand, the microphonic pressure be diminished, *i. e.*, the resistance increased, the current goes from *L* toward *T*. Moreover, these currents are extremely short and of equal duration. Now, whenever a sound is uttered before the microphone, it produces a diminution and then an increase in the resistance of the microphone contact. Consequently, two successive currents of opposite direction are established; and hence it becomes unnecessary to neutralize the line after each electrical impulse, so that sufficient speed can be obtained for telephonic transmission.

If a microphone and a battery be connected to the primary of an induction coil, and the terminals of the secondary to the armatures of a condenser, every variation in the resistance of the microphone causes a charge of the condenser, on account of the difference of potential produced in the secondary circuit.

If the microphone be put in vibration by a sound, a variable periodic charging of the condenser ensues; this causes corresponding variations in the attraction which the armatures exert upon one another, so that the condenser will commence to vibrate and emit a sound; the sounds produced by the latter being always an octave higher than those which act upon the microphone, the condenser is unable to emit articulate sounds. But if a battery be introduced in the secondary circuit which charges the condenser to a constant difference of potential, all sounds uttered before the microphone are reproduced in the condenser of the same pitch, and this constitutes an excellent telephonic receiver.

MM. Dunand and Herz were the first to occupy themselves with this question. In the most simple system, that of M. Herz, the initial charge of the line is obtained by means of a derived circuit from the transmitter battery. The system of M. Dunand, which gives much more powerful effects, requires a second battery inserted in the secondary circuit of the induction coil. In both cases the receiver, consisting of a condenser with loose sheets, has its armatures *charged* in advance, and the variations of the battery current (Herz) or of the induced currents of the coil (Dunand) merely impress a vibration or oscillation of this initial charge. Now, experience has shown that on lines of large electrostatic capacity a very considerable initial charge is required, which, beyond a certain point, may make the practical applications of these methods somewhat difficult. But this difficulty ought to disappear, at least in part, if, as in submarine telegraphy, the line were influenced statically at

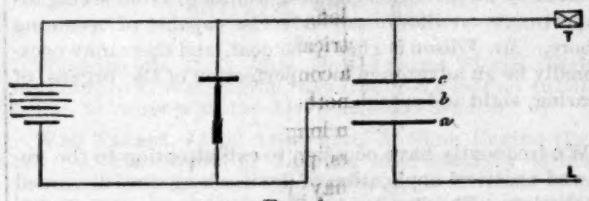


FIG. 1.

the sending station. However, it can be accomplished, as M. Giltay has shown, by charging the line by means of a Zamboni dry battery, in the manner described below.

Each element of the auxiliary battery employed by M. Giltay consists of two cylindrical tubes, 140 mm. high and 22 mm. interior diameter. One of the tubes is filled with sulphate of copper and contains a copper wire; the other is filled with sulphate of zinc, into which dips a wire of amalgamated zinc which is soldered to the copper

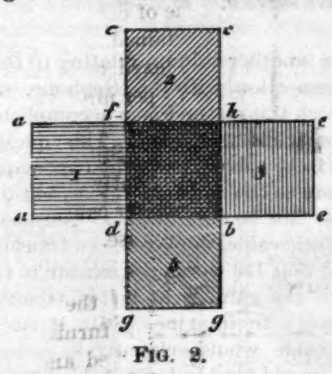


FIG. 2.

wire of the following element. Communication between the two liquids is effected by a small glass U-tube, the interior diameter of which is 3.5 mm, and the length of each branch 10 cm. The resistance of each element is 130,000 ohms.

The condenser is of the Dolbear form and is used in connection with the Ader microphone. The latter is joined to 3 Bunsen cells and to the primary of the induction coil In the secondary circuit are introduced the condenser and

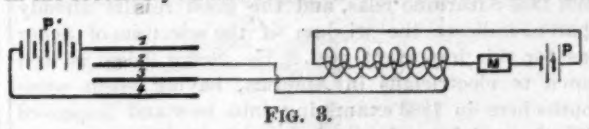


FIG. 3.

20 of the Daniell elements described above. Speech and sound uttered before the microphone are distinctly heard in the condenser, but the sound is feeble. Its intensity increases with the potential of the auxiliary battery, but the sound becomes weaker if, instead of 20 elements, 100 are introduced in the circuit. This anomaly is easily explained, since the resistance of the secondary circuit is considerably increased and the condenser requires a longer time to charge itself, which results in a diminu-

FIG. 4.

tion of the sounds. This can be obviated by using elements of lower resistance, such as Leclanché cells; but the apparatus then becomes rather expensive.

M. Giltay then constructed a condenser the sound of which is independent of the resistance of the battery, and consequently permits the use of the Zamboni dry battery. His first apparatus was constructed in the following manner: Upon a plate of ebonite there is placed a rectangular sheet of tin-foil, *a*, *a*, *h*, *b*, Fig. 2. Upon this a second is laid crosswise, *c*, *c*, *d*, *b*; then a third, *e*, *e*, *f*, *d*, and a fourth *g*, *g*, *f*, *h*. All the sheets are separated by paraffined paper, and the sheets are piled up in the same order to the number of one hundred. The ends of the coördinate sheets 1, 2, 3, 4 are then connected together. The apparatus is mounted as shown in Fig. 3. M Giltay employs 20 Leclanché cells as his secondary or supplemental battery, and the apparatus is said to work admirably; but if 100 Daniell elements are used as above described, nothing can be heard.

M. Giltay then used a triangular air condenser, arranged as shown in Fig. 4. The middle plate is made of copper, 0.05 mm. thick and 90 mm. in diameter, and separated from the other two by a very small distance. The two latter are perforated at the centre, and into these orifices two tubes of hard rubber are screwed, which end in two cups, which are applied to the ears. Finally he used a Zamboni dry pile, constructed with great care, and with it obtained excellent results.

Fire Alarm and Police Telegraph Wires Underground.

Underground cables have now been laid for all of the 170 fire alarm circuits in New York City, for several blocks out from headquarters in each direction. A six-conductor cable to police headquarters, and two three-conductor cables to 301 and 303 Mulberry street—the Police News Bureau—were also laid.

The work was begun on Saturday evening, October 24, was continued day and night, and completed on Tuesday, the 27th. Although numerous street and railroad crossings threatened delay and difficulty, the work was done without interruption to street travel, and, as shown by the electrical tests made, was in every way a success. Communication between the police and fire alarm headquarters (the longest section laid) was established on Monday morning, thirty-six hours after the work began.

The cables used are the Waring anti-induction cables, various lengths of which have been in use by the fire department during the past eighteen months. Each cable has five insulated conductors embedded in lead corrugations around a central insulated conductor, thus forming a six-wire cable in which each conductor is separately surrounded by lead.

The work of laying the cables was done under the able direction of Messrs. W. J. McElroy, W. A. Conner and J. W. Marsh, of the Standard Company. The method employed was very simple and rapid. A trench two feet deep having been dug, boxes or conduits of rough spruce were laid in the bottom to contain the cables. The cable was shipped from the company's Pittsburgh works on reels or drums carrying from a thousand to two thousand feet: these were mounted, as required, on reel carriages, and then drawn along the trench, the cable being paid off and laid evenly into the conduit as the mounted reel moved along. When all the cables required over each route were thus laid into the conduit, the latter was filled with roofing pitch as an additional safeguard against mechanical injury from future excavations. After this an inch and a half cover was fastened on the boxes, the trench refilled with earth and repaved.

Connection between the cable ends and the air-lines is made in a special cable box placed on the poles at which the cable routes terminate, a permanent lightning arrester being interposed between the air-line and the cable wires.

The cables at the Fire Department end extend up to the operating room on the third floor, where they take the place of all the air-lines, so that every signal to and from headquarters passes through these underground cables, and the network of wires will now be taken down and the poles removed as far as the cables have been laid.

With all this work done, it will now be an easy matter to extend the cable lines in various directions to take the place of all the Fire and Police Departments' air-lines, and give these departments an underground system not subject to disarrangement or interference from any cause.

In the present stage of underground cable agitation, it seems fitting and reflects great credit on the Fire Commissioners and Superintendent Smith, that the municipal authorities should lead the way in underground work, and make it an accomplished fact while others are theorizing as to its practicability. The Waring cables, which they have adopted, have been in use in the fire alarm, telegraph and telephone service in the principal cities of this country for several years, and with marked success, not one failure having been reported. Superintendent Crowley, of the Police Telegraph Department, contemplates the early extension of this underground system for the remainder of the circuits of his department.

A Canine Messenger Corps.

A writer in a London newspaper suggests the formation of a corps of messenger dogs, to take the place of or supplement the commissionaires and the telegraph boys of the London streets. The dogs would be uniformed—to the extent of a distinguishing badge around their necks—and would be divided up into districts, each stationed at a certain street corner, from which he knew his way well to the nearest postal telegraph office. When a man wanted to have a telegram sent or a letter mailed, he would whistle to the dog, slip the money and the message into a bag at the dog's throat and send him off, when he would be expected to make a bee-line for the accustomed office, whence he would be again sent to his street corner (with an answer, if necessary), to wait for another customer. If the scheme should be thought worth the trying, there is no reason why it should not be successfully carried out. Every one can recall instances, which he has seen or heard of, of dogs which had been taught to call regularly for the family mail or the newspaper, and take it to their master, and in some parts of rural England the intelligent beasts have been pressed into Government service and cover a regular postal route every day. What, then, is there to prevent them being regularly organized into corps and taught to do the small offices which would be required of them as messen-

ger dogs? No one who thinks of all the dogs he has known, and who remembers the famous dogs of history, will doubt their intelligence and fidelity. And, in some particulars, the dog would certainly be an improvement on the messenger boy. Dogs do not play marbles, nor will they go many blocks out of their way to follow a circus. No one ever saw a dozen hounds sitting on their haunches watching a man peddling patent match safes, and they are proof against the seductive influence of a fire alarm.

The messenger youth, on the other hand, is a frail thing, easy of temptation and subject to mortal weakness. Whatever other results that would follow the mobilization of this novel army, the public would at least gain in rapidity of service, while the Government (or the company which managed the dogs) would be free from all apprehensions of a strike among its employés.

Sir William Thomson's Electrostatic Volt Meter.

This electrometer consists of an air condenser with one of its plates capable of a to-and-fro motion, so as to vary the capacity of the condenser. Fixed brass plates are supported so as to be accurately parallel to each other and in metallic connection, while they are thoroughly insulated from the case of the instrument. The movable plate is of aluminium, and is supported in a vertical position on a knife edge, the plane of its motion being parallel to the fixed plates and situated midway between them. The upper end of this movable plate has a fine prolongation which serves as a pointer for indicating the deflections on the scale of the instrument, and at its lower end is fixed a knife edge having its length perpendicular to the plane in which the plate moves.

There are two pairs of terminals, one pair for fixed plates and the other pair for the movable plate, and each terminal is insulated from the case of the instrument. One of the pair is in metallic connection with the fixed brass plates, while the other (which may be called the working terminal) is simply an insulated brass pin. A glass U tube is suspended between these two terminals, and contains a connecting circuit joining them, consisting of two short wires at the ends of the U tube and an intervening length of thread, kept moist by a little water in the bend of the U tube. One terminal of the other pair is in metallic connection, through a V-groove support, with the movable plate; in other respects this pair of terminals is similar to the first pair.

In order to save time in taking readings, an arrangement is provided for checking the oscillations of the movable plate, and stops are placed to limit its range and prevent damage to the pointer.

When the fixed and movable plates are connected respectively to the two points of an electric circuit, between which there exists a difference of potential, the movable plate tends to move so as to augment the electrostatic capacity of the instrument, and the magnitude of the force concerned in any case is proportional to the square of the difference of potential by which it is produced. In the use of the instrument this force of attraction is balanced by the horizontal component of a weight of any convenient amount hung on the knife edge at the bottom of the movable plate.

The scale is graduated from 0 to 50, and the divisions represent equal differences of potential—the actual magnitude of the difference per division being dependent upon the weight in use at the time. The lightest weight, which is in the form of a link, is 31.65 milligrammes, the next heavier is 94 95 milligrammes, and the heaviest 379.8 milligrammes; or if W represent the weight of the link, they are 1 W, 3 W, and 12 W. Thus, when the second weight is hung on below the first the whole weight on is 4 W, and when the third is added the whole weight on is 16 W. Hence the three grades of measurement provided for are in the proportion of 1, 2, 4; this represents 50 volts per division with the link only on, 100 volts per division with the link and the second weight on (4 W = 126.6 milligrammes), and 200 volts per division with all three weights on (16 W = 506.4 milligrammes).

With this instrument the readings can be taken off directly, which makes it very convenient to use.

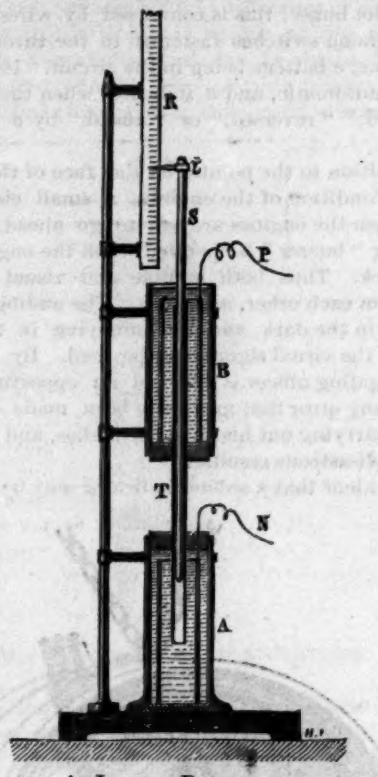
A Liquid Rheostat.

In many investigations, both of a practical and experimental nature when quick work is undertaken, it is often desirable to have a high resistance at hand, which need not of necessity be perfectly accurate. At the same time, lower resistances in the same instrument make it of additional value, permitting of a larger range of use. High resistance coils, as ordinarily made, are quite expensive, and a good and less costly substitute will, therefore, be welcomed by many. Such an instrument has recently been devised by MM. Bouty and Foussereau, who have used it in their experiments for measuring the resistance of liquids with alternate currents.

The liquid rheostat is shown in the accompanying engraving, taken from *La Lumière Electrique*. It is composed of two vessels, A and B, placed one above the other, each containing a cylindrical copper electrode of several square decimeters surface. The vessels are connected by a glass tube T, open at both ends, and into which dips a glass rod S, of nearly equal diameter. The vessels are filled with a solution of copper sulphate, so that by raising or lowering the rod in the tube, the resistance can be varied at will. The upper end of the rod carries a pointer i, which slides along a graduated scale, so that readings can be easily taken. The scale is graduated by measuring the increase of resistance for each division by means of an electrometer.

If the measurements are desired to be absolute, the temperature of the liquid must be carefully determined, as its resistance varies $\frac{1}{50}$ of its value at 0° for every degree centigrade. For making relative measurements rapidly, however, such correction may be dispensed with.

One of the rheostats used by the experimenters had a resistance which could be varied between 1,200 and 5,000 ohms, which permitted the comparison of resistance limited to the ratio of 1 to 4. By using supplementary siphons

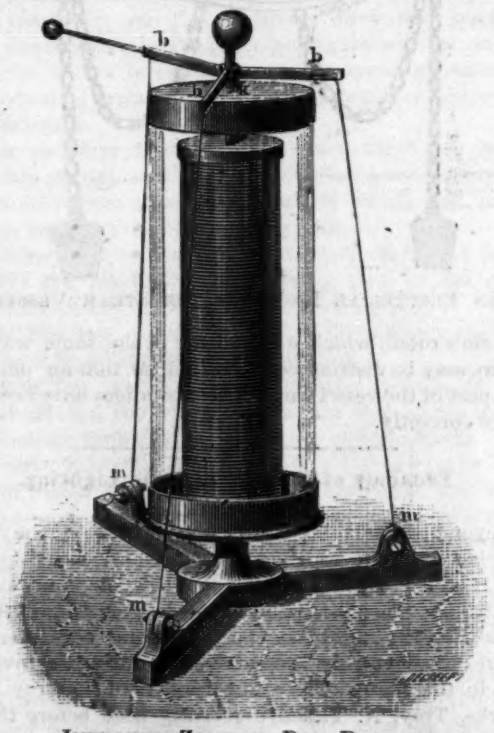


A LIQUID RHEOSTAT.

and changing the fixed resistances of the Wheatstone bridge to the ratio of 1 to 50, the lowest of the two resistances to be compared could be varied from 24 to 62,000 ohms.

A Constant Dry Battery.

In his experiments on atmospheric electricity on Mount Vesuvius, M. Palmieri makes use of a dry pile, which he finds to be of great constancy. As generally constructed, the energy of dry piles depends considerably upon the



IMPROVED ZAMBONI DRY BATTERY.

hygrometric state of the atmosphere and upon the temperature. M. Palmieri has, by a very simple means, succeeded in making it constant to a certain extent, so that it may be used for exact measurements. In their ordinary construction the Zamboni dry piles are built up of hundreds of discs of paper and tin, inclosed in a tight-fitting glass tube, the extremities being metal washers, which constitute the poles. With this arrangement it frequently happens that, on account of the deposition of water vapor from the air upon the exterior of the tube, the difference of potential is neutralized to a considerable extent.

The dry pile of M. Palmieri is shown in the accompanying illustration, for which we are indebted to *La Lumière Electrique*. The column is built up, as usual, of discs of paper covered on one side with tin foil, and upon the other with peroxide of manganese applied with milk. Instead, however, of introducing the discs into a close-fitting tube, M. Palmieri builds them up in a glass tube, the interior diameter of which is several millimeters greater than that of the discs. The latter are thus surrounded by a layer of air from the protecting envelope, thus obviating any direct contact, which is a source of loss. The column rests upon a metallic base; at the top it is compressed by a copper disc placed under the screw K, the thread of which carries a nut with three arms, b b b. From the latter three braids of a pure silk connect with the pins m m m. By this arrangement the pressure on the battery can be varied at pleasure, and a remarkable constancy can be maintained for years. Only at long intervals need the silk braids be dried.

There can be no doubt that moist batteries weaken in time, but their life is truly remarkable. One of the first constructed by Zamboni showed traces of activity after fifty-six years, and M. Palmieri possesses one, made by Zamboni, which, after a period of fifty years, has not yet entirely lost its energy.

To Find a Galvanometer Constant.

BY PROF. A. E. DOLBEAR.

One of the correspondents of THE ELECTRICAL WORLD lately inquired how he might find the constant of a tangent galvanometer, and I will offer the following method as being one which will be available for approximate results, where apparatus for more accurate determinations is not at hand.

The constant of a tangent galvanometer is the number which, being multiplied by the tangent of the angle of deflection, gives the current strength in ampères.

Let K = constant.
" φ = angle of deflection.
" C = current in ampères.
Then $K\varphi = C$ and $K = \frac{C}{\varphi}$.

We will suppose we have a tangent galvanometer to calibrate or to find the constant of, as nearly as may be possible with only a Daniell cell, or gravity cell, and a coil of wire of known resistance, say 100 ohms. The resistance of the galvanometer coil should also be known; suppose it is to be 100 ohms. These numbers are only taken for convenience, any others may be substituted for them.

According to Ohm's law $\frac{E}{R} = C$. Now the E. M. F. of a good Daniell cell may be reckoned at 1.1 volts, from which it follows that the current strength in such a circuit including the cell, the galvanometer and the 1,000 ohm coil will be $\frac{1.1}{1000 + 100 + x}$. This x is the resistance of the cell itself. A good cell of that kind ought not to have a resistance greater than 5 ohms, and it may be less, but for this purpose we will assume it to be 5 ohms. As the total resistance of the circuit is upwards of a thousand ohms, the difference of an ohm or two will make a difference of only a fraction of one per cent. difference in the current strength, $\frac{1.1}{1105} = .00099$ ampères. Suppose that the galvanometer needle is deflected to 25° by this current. $K = \frac{.00099}{\tan 25°}$, $\tan 25° = .466$; $\frac{.00099}{.466} = .00212 = K$.

This number, .00212, when multiplied by the tangent of any other angle will give the current strength in the circuit. For instance, a certain current gives a deflection of 45°, what is its strength? Tan 45° = 1. Hence, 1 × .00212 = .00212 ampère. Of course this is not *absolutely* the value, because the E. M. F. of the cell is not absolutely known to be 1.1 volts, but it will differ from the absolute result by less than one per cent., which is frequently as near as one cares to know. If instead of a Daniell cell, one takes a bichromate cell freshly set up, and with proper proportions, the E. M. F. may be taken as 2 volts, and its internal resistance may be ignored if the external resistance be a thousand ohms or more. The higher the resistance that can be used external to the cell, and which still gives several degrees deflection, the more nearly accurate the results will be, but the fractions of degrees should be read in tenths, if possible.

Natural Gas and Electric Light.

The Alleghany County Light Company, of Pittsburgh, Pa., have since June last been using only natural gas for fuel under their boilers, consisting of a battery of four, of 100 horse power each. The first thing that one is sensible of on entering the boiler-room is the absence of the almost unbearable heat usually found in such a place, and the entire absence of a perspiring, coal-begrimmed specimen of humanity sitting at the entrance, trying to keep cool.

The gas is conveyed in pipes from Westmoreland County, some thirty miles distant from Pittsburgh, and enters the boiler-room from the mains at a pressure of 6 lbs., passing through a regulator which reduces it to from 6 to 12 ounces per square inch before being led under the boilers. It burns with a roaring sound something like a blast furnace.

Mr. McGonnigle, the secretary of the company, states that it effects a considerable saving, and that they are able to dispense with the services of one fireman and the expense of hauling away ashes.

The boiler flues have not been cleaned in five months. As the gas emits no smoke, there is no scraping to be done. The boiler-room, instead of being a coal-hole, as is usually the case in electric light stations, is "a place of beauty," and were it not for the warm atmosphere it might

be used as an office by some very economical companies anxious to swell profits. This company run some 300 Brush arc lights, and are doing a very successful business under the able management of Mr. S. A Duncan. Two portable boilers and engines of 25 horse-power, mounted on trucks with dynamos, are kept standing in the station ready to supply light at a moment's notice for picnics, railroad and other corporations requiring light for outdoor operations.

The officers of the company are Jos. S. Brown, President; Jas. E. Ridall, Vice-President; S. A. Duncan, Manager; R. D. McGonnigle, Secretary and Treasurer.

Our electric light brethren on reading this will wish they were so fortunately situated, but they can console themselves with the hope and belief that the day is not far distant when natural gas will be distributed to various parts of the country. The matter is now under consideration, and Mr. Geo. Westinghouse, of air-brake fame, is understood to be one of the prime movers in the matter.

Mr. Gower's Disappearance.

The subjoined comes from Havre, France, in explanation of the disappearance of Mr. F. A. Gower: "On July 18, Mr. Frederic A. Gower made a balloon ascension from Cherbourg, intending to cross the channel to England. He did not reach his destination, and the balloon, without the car, was afterward found in the channel near Dieppe. Mr. Gower came to Europe in 1878 in connection with the business of the Bell telephone. He came before the European public as a young man of about 30, the son of a clergyman, refined, well educated, and having a knowledge of men and the world that he had acquired on the staff of a popular daily newspaper in Providence, R. I. If he did not possess the philosopher's stone he seemed to possess its charm. Success followed all his ventures, and, after a few years, judging by his beautiful apartment in Paris, the horses he drove in the 'Bois,' and his yacht in the channel, his financial success with the telephone permitted him to indulge in a line of research that was almost a monomania with him—ballooning. His great ambition was to be able to direct a balloon over a long distance. Years ago he had agreed with his brother, Gen. George Lewis Gower, that some day they would cross the Atlantic together in a balloon. Mr. Gower made many ascensions near Paris, where he had constructed a large building for experimental purposes and for testing the adaptability of balloons for war purposes. Last spring he made Hythe, in England, the centre of his operations, and from there made several ascents, finally leaving England for France in a balloon, successfully crossing the channel early in June. At Cherbourg Mr. Gower made several successful ascensions, and finally, on July 18, started, in the presence of admirals of three nations, with the intention of recrossing to England, wishing to demonstrate to these dignitaries the advantages of the power to throw war balloons in defined directions at long distances." He was never seen again, although the balloon without the car was picked up the same evening at sea.

Litigation over Stock Tickers.

Argument was heard on Oct. 31, by Judge Shipman in the United States Circuit Court, in a suit in equity brought by the Gold and Stock Telegraph Company against the Commercial Telegram Company. Mr. E. N. Dickerson and Mr. C. L. Buckingham were counsel for the complainant, and Mr. Roscoe Conkling and Mr. David Dudley Field appeared for the defendants.

Counsel were heard on a motion for an attachment against the defendants for contempt of an injunction restraining them from infringing the second claim of Calahan's reissue patent, No. 3,810, by using the Field printing telegraph instrument, which is popularly known as the gold and stock indicator. The complaint alleges that the defendants to avoid the injunction tied up the figure type wheel of the machines, preventing it from rotating, but that in other respects the defendants' instruments were not changed. The question was whether, by tying up the figure wheel, the machine could be used without infringing the second claim of the Calahan patent. The Calahan patent expired on April 21, 1885, and it is alleged by the complainants that the defendants untied their figure type wheels and resumed the use of the instrument in the same manner as before the injunction took effect. This is regarded by the complainants as a contempt of the injunction of the Court. They claim that the machines made by the defendants during the lifetime of the patent could not be used after its expiration. In support of this view Mr. Buckingham quoted a number of cases and submitted them for the consideration of the Court.

Mr. Conkling replied in behalf of the defendants, and urged that there had been a full obedience to the decree of the Court, and that the tying up of the wheel was an act that prevented the rights and claim of the patentee from being infringed. Even if that were not so, he claimed that the principle of the patent had been known long anterior to the Calahan patent, and that the defendants had the right to do the very thing that they did. Mr. Conkling then discussed the broader question as to whether it was likely that equity proceedings contemplated restraining the defendants from ever manufacturing, selling or using a machine the peculiar construction of which had been protected by a patent, but the life-time of which patent had expired. Argument continues.

An Electrical Indicator for Steam Vessels.

Electricity finds numerous applications on board ship, insuring both safety and comfort. One of the more recent of these is its use in conveying certain assurance to the navigating officers of steam vessels that their signals to the vessel engineers have been correctly received and obeyed. Our illustration shows such an apparatus recently designed by the Novelty Electric Company, of Philadelphia. It consists of a two-faced indicator which is placed in the pilot house: this is connected by wires with direct and reversing switches fastened to the throttle valve of the engine, a battery being in the circuit. Its operation is entirely automatic, and it indicates when the engines are "stopped," "reversed," or "ahead," by a very distinct pointer.

In addition to the pointer on the face of the dial, showing the condition of the engines, a small electric bell is rung when the engines are set to go ahead, and a dull-sounding "buzzer" is operated when the engines are set to go back. Thus both audible and visual signals, distinct from each other, are given. The audible signals are of value in the dark, and not annoying in the daytime, or when the visual signals can be read. By these means the navigating officer is afforded an opportunity of correcting any error that may have been made by the engineer in carrying out his signaled wishes, and of avoiding possible disastrous results.

It is evident that a second indicator may be placed in the

AN ELECTRICAL INDICATOR FOR STEAM VESSELS.

captain's room, which will indicate in the same way, and others may be distributed as desired, so that an officer in any part of the vessel can tell if his orders have been executed correctly.

...onomy of Fuel in Electric Lighting.

Beyond a doubt the "burning" question of the day of the electric light companies is the economic consumption of fuel, and it is significant that so much attention was earnestly devoted to this point at the last meeting of the National Electric Light Association. Some very interesting figures have recently been arrived at during an investigation in this State. The commissioners of the Troy Water Works, Troy, N. Y., have recently been before the city council of that city to defend themselves against charges of extravagant outlay of the public money, The charges were made by the former city engineer. Last fall the water board decided to look up the question of economy of fuel. They visited the water-works of the neighboring city of Binghamton and after a thorough investigation decided to reset over half of their boilers, three in number, with the same boiler setting in use at Binghamton. The boilers of that city had been set in 1879 with the Jarvis furnace, a boiler setting that is controlled by the Jarvis Engineering Company, of Boston, a concern that makes a business of erecting steam plants, motive and other power. The report from Binghamton, after six years' trial, was very favorable, and the results were confirmed by an examination of the books giving the amount of fuel formerly used, with the cost of same, together with the gallons of water pumped. After the three boilers were reset at the Troy Water-Works, the results obtained were confirmed by the report of the engineer of the water-works, who in his last annual report, dated March 3, 1885, says as follows:

EXTRACT FROM REPORT OF P. H. BAERMANN, CHIEF ENGINEER, TROY WATER-WORKS.

R. F. Hall, Esq., President of the Board of Water Commissioners.

SIR: In compliance with the instructions of the board, the following report of the operations of the pumping system for the year ending February 28, 1885, is respectfully submitted.

* * * * * * *

The resetting of the boilers, as a matter of necessity, being decided upon, a careful and somewhat extended examination was made, with the object of substituting for the old setting one which, by burning cheaper coal or dust, would reduce the cost if not the quantity of coal consumed.

As the result of such examination, and under proper guarantee, the Jarvis patent boiler setting was introduced. The peculiarity of this furnace consists in the setting, whereby air is admitted by small flues in the front and then conducted through a number of horizontal expanding ducts in which it traverses backward and forward until it finally, and in a heated state, enters by the bridge-wall and sides of the furnace in jets through fire-brick plates, uniting with the products of combustion and causing consumption of the gases. The economy claimed for the Jarvis setting over the old way is the fact that it will burn all kinds of cheap fuel without the use of a blower, that is, anthracite coal screenings (with a mixture of bituminous), bituminous slack coal, pea coal, wet peat, sawdust, etc.

To prevent great loss by allowing a combustible gas such as carbonic oxide to escape unconsumed, numerous devices have been suggested for supplying the furnace with heated air above the fire, and thus effecting combustion in the furnace before the gases have time to escape.

To accomplish this result, it is the object of the peculiar way of setting the brick-work, which is so built that what is required by the fire in addition to the air through the grate is furnished in hot air discharged on top of the fire to mix with the gases generated in the grate.

The following is the result of a test of the Jarvis setting using bituminous coal and coal-dust:

RECORD OF THE TEST OF THE JARVIS BOILER SETTING UNDER THE THREE NORTH BOILERS, BEGINNING MONDAY, FEB. 9, AT 10:30 A. M. ENGINE NO. 1.

Date.	Hours run.	Bituminous coal, lbs.	Coal-dust, lbs.	Revolutions.	Gallons of water pumped.	Ashes, lbs.
	h. m.					
Monday	13:30	3,575	10,525	9,556	2,285,912	1,130
Tuesday	23:47	8,250	15,900	19,764	5,968,728	4,005
Wednesday	24	9,000	17,700	23,388	7,123,576	3,500
Thursday	24	9,300	18,600	24,726	7,467,252	5,535
Friday	24	8,900	17,400	23,521	7,101,342	3,450
Saturday	24	8,100	16,200	22,148	6,688,696	5,390
Sunday	24	2,700	17,400	23,142	6,988,884	3,600
Monday	10:30	4,500	8,400	9,941	3,002,182	2,040
		60,325	122,125		46,626,572	28,650

Total coal, 182,450 pounds. Ash, 15.1 per cent.

26.9 tons at $4.85	$130.46
54.5 tons at $1.25	68.30
81.4 tons, cost	$198.76

Raising 46.6 million gallons into the reservoir at a cost in coal alone of ... $5.27 per million.

Average cost in coal in year 1881	7.83	"
" " " 1882	5.45	"
" " " 1833	7.33	"
" " " 1884	6.83	"

A mean cost of coal per million gallons raised into the reservoir of $7.36. The saving shown by this test in the cost of coal, if maintained for an entire year, would show a coal account of $7,545.09 in place of $12,069.97, an economy of $4,524.88.

Another noticeable feature of the test is the reduction in ash from a yearly average of 19.03 to 15.1 per cent. of the total coal consumption. A comparison is here made of the three south boilers with the old settings, using Lackawanna coal.

ENGINE NO. 1, BEGINNING FEBRUARY 1, 1885.

DATE.	Hours run.	Lackawanna coal, lbs.	Ash, pounds.	Gall. water pumped.
	h. m.			
Sunday	24	22,822	4,585	6,681,750
Monday	23:14	23,115	4,271	6,559,742
Tuesday	24	22,529	4,405	6,811,308
Wednesday	24	22,529	4,695	6,795,302
Thursday	24	22,822	4,695	6,682,656
Friday	24	21,943	4,065	5,736,118
Saturday	24	21,943	4,780	5,916,214
		157,703	30,496	45,183,160

Total coal, 157,703 pounds. Ash, 19.3 per cent.

70.4 tons at $4.35, $306.24, raising 45.183 million gallons into the reservoir at a cost in coal alone of $6.77 per million.

* * * * * * *

All of which is respectfully submitted.

P. H. BAERMANN, Chief Engineer.

This was not satisfactory to some interested parties, and

the charges of extravagance were made. An investigation was ordered by the city government. The Board of Water Commissioners appeared before the City Council with their books. They stated they should not make any regular defense, but simply state the facts, which would be backed up by an examination of their log-book. They stated the cost of the total change was about $2,600, but it could not all be charged to this alteration, as the boiler settings were in a bad shape. As a vindication of their action in the matter, they would simply present their log-book showing the cost of running per day before the change was made and the present cost. An examination was made of the books by the City Council, and the result was a complete vindication of the Water Board, as the economy was shown to be over $17 a day as compared with the previous record before the boilers had been reset with the Jarvis furnace. As a result of all this investigation, the Water Board ordered the rest of the boilers to be set the same way, and the Jarvis Engineering Company has just completed the work. We congratulate the company, as well as the Water Commissioners of the city of Troy, on the results.

A New and Simple Burglar Alarm.

As every important invention comes to the knowledge of men, it is eagerly snatched up on the score of its usefulness, while defects of construction and complexity of methods are charitably overlooked in the gratification that attends the satisfaction of a want. Soon after its entry into use, however, the patrons of the article begin to examine more critically its operation, and to wish that "this" could be dispensed with or that "that" could be added. In short, more simplicity and greater efficiency are soon demanded.

The electric burglar alarm in this respect has shared the fate of all other machinery, electric and mechanical. It is a not infrequent complaint that the details of the alarm are such as not to be readily within the grasp of any but experts; that the plant is expensive; that its application requires special skill, and that its subsequent care and maintenance is a source of concern to the novice.

At this juncture, Messrs. E. S. Greeley & Co., Nos. 5 and 7 Dey street, New York, the well-known manufacturers of electrical goods, and the perpetuators of the old firm of L. G. Tillotson & Co., have invented and taken the necessary steps to patent an electric burglar alarm device which they have christened "The Security Electric Trap," which makes it possible to do away with the insertion of window and door springs as well as a multitude of wires. It brings the electric burglar alarm and its application down to simplicity itself, so that a complete outfit can be bought for much less money, be located

A NEW BURGLAR ALARM.

upon the premises in one-fifth the time usually required, and the whole work be accomplished effectively and understandingly by the merest tyro in electrical lore.

The Security Electric Trap is a circular metal case, 2¼ inches in diameter and ¾ of an inch deep. Projecting from the case less than half an inch is a movable arm or lever, pivoted in the case centre. The lever has an axial action, and at its free end moves through about two inches of an arc. At the outside extremity of the trap lever is an eye to which one end of a small cord is attached, the other end terminating in a small brass ring.

In practice, the trap is fastened by means of screws to some convenient permanent fixture upon the premises to be protected, about twelve inches above the floor surface. The cord, which is of the required length, whether five feet or twenty, is stretched across the room or thoroughfare, and the brass ring looped over a small hook screwed into another permanent fixture.

In looping the ring over the hook, care is taken to draw the string sufficiently tight to pull the trap lever forward half-way, into what is termed the "set" position. Upon the face of the trap is an indicator, ingenious in its simplicity, that records whether the proper tension is upon the cord or whether it requires to be slacked or still further tightened.

After adjustment, should the cord be disturbed by being broken or even struck against, as would be the case in the event of any one passing over the ground, an electric alarm would be given. By means of branch cords attached to valuables, as in show windows, they can be protected from abstraction against any one reaching in from the outside.

The Security trap is practically an automatic electro-mechanical circuit-closer that reduces the burglar alarm circuit to the simplicity of the ordinary electric call bell system, in which the trap is the push button. As in the case of the buttons, as many traps as desired can be placed upon a single circuit. This is a valuable auxiliary to more elaborate systems of burglar alarms; and as it is made up for either "open" or "closed" circuit work, it will be found of the highest value to the members of the profession and trade, who should always prefer to employ perfect mechanical devices of thoughtful design such as this, to home-made makeshifts that so often bring electric work into disrepute.

Static Electricity.

BY PHILIP ATKINSON, A. M., PH. D.

CHAPTER VI. (*Continued*).

ACCUMULATORS.

THE RESIDUAL CHARGE.—When a Leyden jar is discharged, there still remains a slight difference of potential between the coatings, which is known as the *residual charge*. Hence, a small discharge can be obtained a moment after the first, and this also leaves a residual, bearing about the same porportion to the second discharge as

FIG. 24.—JAR WITH MOVABLE COATINGS.

the second to the first, when the same length of time elapses between them.

A number of successive discharges may thus be obtained, which constantly decrease in amount till no farther discharge is perceptible. But, even then, it is not probable that perfect equilibrium is restored.

To understand this, we must remember, that even the best dielectric is a partial conductor, and that while electric movement is instantaneous in a good conductor, it is very slow in a non-conductor.

In the Leyden jar we have a combination of both—two conductors separated by a non-conductor. And, when the charge is given, every part of each coating instantly becomes electrified, one coating positively and the other negatively, on the surfaces next the glass.

The electricity on the positively electrified coating slowly penetrates into the glass, acting inductively on its electricity, which it repels from the opposite surface; and producing, probably, a temporary strain or distortion of its structure.

When the first discharge takes place, there is a relief from this strain; and, as the electrified glass slowly returns to its former state, the electricity which had penetrated it returns to the conducting surface.

This view receives confirmation from the fact that delay increases the residual charge, giving time for the electricity to come out of the glass and accumulate.

Delay has the opposite effect on the primary charge, reducing it by giving time for dissipation.

Tapping the jar lightly, hastens the increase of the residual charge, the vibratory motion thus given to the glass tending, probably, to relieve the electric strain.

JAR WITH MOVABLE COATINGS.—If a Leyden jar be constructed with any rigid metal, as sheet brass, for both coatings, as suggested on page 119, and the conducting rod be attached to the inner coating, the coatings may be removed and replaced at pleasure, as represented in Fig. 24, and we have the means of investigating certain phenomena in regard to the electrification of the different parts.

Let a charge be given to such a jar and the coatings removed carefully, so that they shall not be connected by a conductor during removal; they may now be brought into contact without producing any electric effect; the jar also may be handled with a like result, but on replacing the coatings, a full discharge can be obtained the same as if they had not been removed.

But if, while the coatings are removed, the jar be examined by touching with the finger and thumb or a small discharger, made with a bent wire, both surfaces, at any point below a line marking the position of the upper edges of the coatings, a discharge can be obtained from that point. In this way a number of small discharges can be had from various points, but no general discharge.

This proves that *the charge remains on the glass, while the coatings are removed*, but that the resistance of the glass prevents a general discharge.

But it cannot be accepted as proof that the charge is confined to the glass when the coatings are in contact with it, unless it can be shown that the charge remains on the glass after the removal of both coatings at precisely the same instant, which could not be done with the care necessary for so delicate an experiment.

But when the coatings are removed separately, the charge must be transferred to the glass during the removal of each, since it is impossible to produce any change of potential on either surface, unless a corresponding change is produced, at the same instant, on the opposite surface, each being bound by the opposite.

VARIOUS EFFECTS OF THE DISCHARGE.—The discharge of a Leyden jar of moderate size is sufficient to explode gunpowder, and to ignite various substances; as phosphorus, powdered resin, sulphuric ether, and alcohol; while that of a Large Leyden battery fuses wires, magnetizes steel, and destroys animal life.

With a battery of 550 square feet of coated surface, large steel bars have been magnetized, iron wires, $\frac{1}{118}$ of an inch in diameter, and 25 feet long, melted into globules; and tin wires, $\frac{1}{18}$ of an inch in diameter, and eight inches long, dissipated in smoke.

Tyndall accidentally received a charge from a Leyden battery of "fifteen large jars" during a lecture, and describes his experience as follows: "For a sensible interval life was absolutely blotted out, but there no trace of pain. After a little time consciousness returned; I saw confusedly both the audience and the apparatus. But though the *intellectual* consciousness of my position returned with exceeding rapidity, it was not so with the *optical* consciousness. For my body presented to my eyes the appearance of a number of separate pieces. The arms, for example, were detached from the trunk and suspended in the air. In fact, memory and the power of reasoning appeared to be complete long before the restoration of the optic nerve to healthy action."

Gunpowder cannot be exploded by the ordinary discharge; the only effect of which is to scatter it. But when the discharge is retarded, by introducing into the circuit an imperfect conductor, as a wet string, it explodes readily. By this method also gun-cotton, phosphorus and other highly inflammable substances may be ignited.

For such experiments the *universal discharger*, represented by Fig. 25, is convenient. It is constructed with a base, in the centre of which, mounted on a stem, is a small circular tablet of some insulating material, as ebonite, and at each end, mounted on insulating stems, are brass sliding rods, each terminating in balls at both ends, and passing through a socket hinged on the top of its stem. A plaster-of-paris receptacle, to hold inflammable substances, should also be provided.

The substance to be operated on is placed in the receptacle on the tablet, the inner terminals of the sliding rods

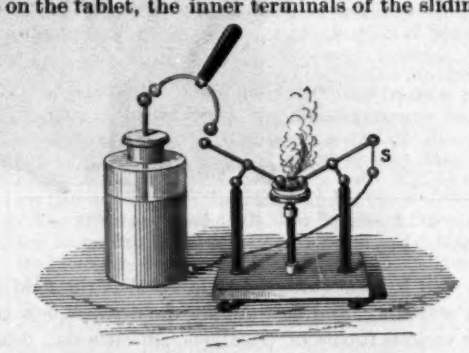


FIG. 25.—UNIVERSAL DISCHARGER.

adjusted on opposite sides of it, and the outer terminal of one rod connected with the outer coating of the jar or battery, and the circuit completed by connecting the outer terminal of the other rod with the knob of the jar or battery, by the discharger, as shown.

The wet string, or other imperfect conductor, when used, can be introduced into any convenient part of the circuit, as at *S*.

SPONTANEOUS DISCHARGE.—A spontaneous discharge is liable to occur in attempting to charge a jar beyond its capacity, and, if the glass is thin at any point, it may be fractured in this way; but if the resistance of the insulating margin is less than that of the glass, the discharge will take place over that surface, without injury to the jar, electricity always following the path of least resistance, whether longer or shorter.

DISRUPTIVE DISCHARGE.—When a discharge takes place through the air or any other dielectric, it is termed *disruptive*, since the electricity must force a passage and break down opposing barriers.

Such a discharge is always accompanied with light, heat and sound, as expressed by the terms *spark* and *snap*, *flash* and *report*—effects due to the resistance encountered and not qualities inherent in electricity.

SILENT DISCHARGE.—But when the discharge takes place through a good conductor of sufficient size, it is termed *silent*, since only slight resistance is encountered, sufficient only to produce a slight amount of heat; light and sound being absent.

The discharge through a point is also termed silent, since a point, as already shown, offers no resistance; and hence there is little or no sound, even when the discharge passes through intervening air. A battery discharge sufficient to destroy life may be received with impunity through the point of a cambric needle, held in the hand, without producing any unpleasant sensation.

(TO BE CONTINUED.)

A Novel Battery Cell.

The care required in the handling of glass battery cells has long since caused the adoption of those made of kerite and rubber, more especially for experimental purposes, in which the cells are frequently taken apart and set up again. Recognizing the utility of the rubber cell, the United States Electrical Company, of this city, has designed one in which the hard rubber is reinforced by a metal casing. The cell, one form of which is shown in the accompanying engraving, consists of hard rubber, which is vulcanized directly to the metal case, thus forming a complete adhesion. The upper end of the rubber cell is carried over the top of the metal shell, and overlaps the latter so as to prevent the acid from getting between rubber and metal. In order to make the cell completely acid-proof, the outside of the metal case is japanned. A bail is also provided, which makes the cell easy to transport, and renders it a very convenient acid carrier. The "Vulcan," as this cell has been called, is made in various sizes, both round and oval, so as to be applicable to different work.

A NOVEL BATTERY CELL.

Electro-Medical Apparatus.

It has been said that, in order that progress shall be had in any branch of science, appropriate apparatus is necessary. Scientific speculation is a great lever, but it must be controlled by experiment; speculation must be tested by experiment, for the human mind is too apt to be seduced by the pleasure of speculative philosophy, and too prone to abandon the paths of observation and sound induction. From the want of apparatus and the ignorance of its different modes of manifestation, electricity, as a therapeutic agent, was for a time seized upon by the charlatan and neglected by intelligent practitioners of medicine. This has now been changed, and to-day no physician can be considered well equipped in his profession without a knowledge of electricity as a therapeutic agent. We cannot here enter into a description of the methods applicable to each disease, but it is encouraging to know that the field is constantly widening, and that among the diseases now treated are the various forms of paralysis, anæsthesia, deafness, nasal catarrh, suspended animation, rheumatism, neuralgia, dyspepsia and a number of others. Among the Western firms which have engaged in the manufacture of apparatus for the treatment of these diseases, the McIntosh Galvanic and Faradic Battery Company, of Chicago, has attained great prominence. Its manufactures include all varieties of instruments and accessories, a few of which we describe below.

The Faradic battery shown in Fig. 1 is intended for use at home in private application, and is fitted with all the means for varying the strength of the induced current as desired.

The physician's battery is shown in Fig. 2. It contains eighteen cells, and can be used in applying both the Faradic and the galvanic current. Various forms of this combined apparatus are made to be used in connection with the electric bath and other treatment.

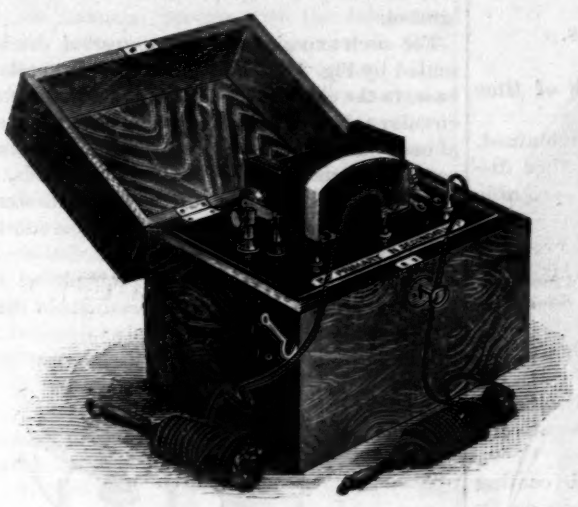
A novel electrode is shown in Fig. 3. It is designed to take the place of the old-style sponge electrode. The carbon disc, which takes the place of the sponge, is soldered to a metal disc, and both are covered with soft rubber (except the outer surface of the carbon), which is then vulcanized or hardened. By this process, the rubber is made to adhere so firmly to the edge of the carbon disc that they become virtually one piece. This prevents fluids from entering between the carbon and rubber. Between the rubber handle and rubber-covered carbon is a hard rubber disc, to hold a cloth cover or sponge when the handle is screwed against the disc.

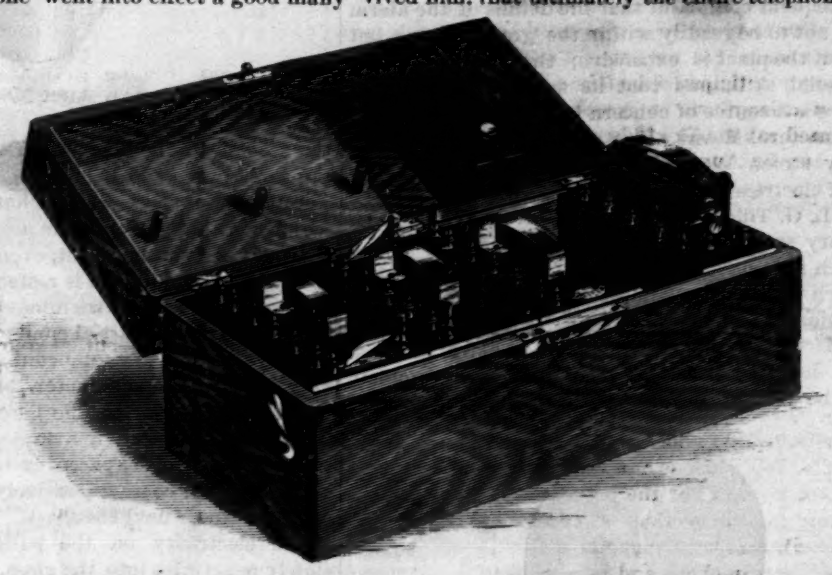
This arrangement is very convenient, as cloth covers can be used over the carbons and changed with each treatment, thus insuring perfect cleanliness.

Another novelty is the wheel electrode of hard rubber, shown in Fig. 4. It is used in connection with the massage treatment, and is set with metallic points, for muscular faradization. The handle of hard rubber is provided with a current interrupter.

Another interesting instrument is the electric bullet probe, shown in Fig. 5. It is made by twisting two wires together with an insulating substance between them. On one end of the probe the wires bifurcate and connect through the rubber insulating knob, with conducting cords from one galvanic cell. In the other end of the probe the wires are only separated by the insulating substance. In use the probe is connected with a galvanic cell, including a galvanometer in the circuit. When the ends or side of the probe touch any metal so as to complete the circuit, the galvanometer is instantly deflected.

Our limited space prevents us from entering into a more extended description of the extensive and excellent work of the company, but those described are sufficient to demonstrate a thorough appreciation of the needs of physicians and experimenters in medical electricity.

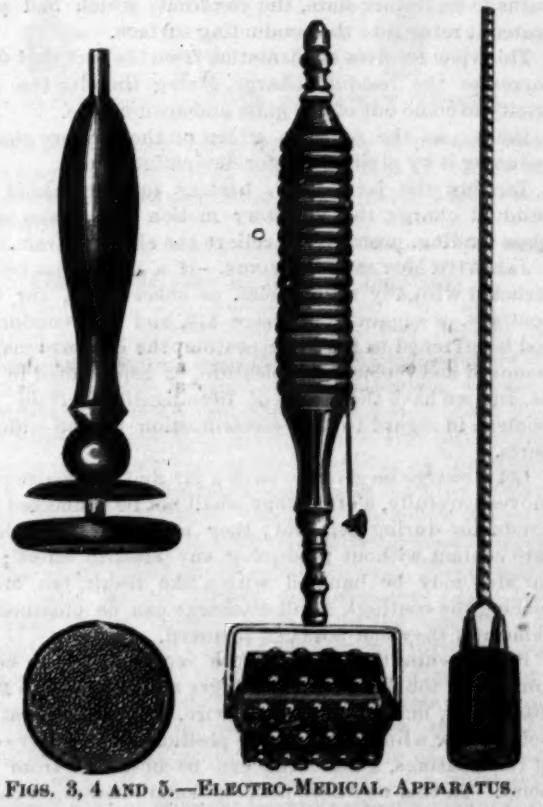




FIGS. 1 AND 2.—ELECTRIC-MEDICAL APPARATUS.

Telephone Troubles at Burlington, Vt.

The contest now going on in Burlington, Vt., seems to have assumed a new phase. "When the increased charges for the use of the telephone went into effect a good many of our citizens," says the Burlington *Free Press*, "ordered their instruments removed, and several property owners over whose buildings a number of wires passed ordered the company to remove the wires or pay them a certain sum for the accommodation. The telephone company declined, and asked the Board of Aldermen for permission to place a line of poles on Church street to reach their office. The Board reported against granting it."



FIGS. 3, 4 AND 5.—ELECTRO-MEDICAL APPARATUS.

Another application being referred to the Street Committee, permission was granted by a majority vote, and the company began to erect poles, but were enjoined from continuing because another vote by the Aldermen withdrawing permission had been passed.

The telephone company, thus checked, now gives notice to its patrons in Burlington that owing to the action of property owners in ordering wires off their buildings, and the refusal of the city authorities to give the right of erecting poles to bring such wires to the central office, that all service will be discontinued; and thus the matter remains at present.

New Haven's Telephone Capitalists.

There are a number of men in New Haven, says a New York daily, who for the past four or five years have felt very much like asking somebody to kick them. These are men who had a great fortune at hand and turned their back on it because they did not know it. Governor Jewell, two or three years before his death, became enthusiastic over the telephone. He caught the fever in Boston, where the telephone first asserted itself, and brought it to Connecticut. He desired to form a local company that would control the State; but he went begging. Nobody knew anything about the telephone. Nobody had any faith in it. At last Governor Jewell found three men who were willing to go in with him. One was a young lawyer, Morris F. Tyler—somewhat prominent last year as one of the leading New Haven Mugwumps—who had been the executive secretary of Governor Bigelow. Another was a shrewd business man named H. P. Frost, and there was a third. Jewell died just as he was beginning to see the splendid returns his company was getting, but under Tyler and Frost this little company has developed into the Southern New England Telephone Company, which controls two-thirds of the business in New England out of Boston, the Washington and Baltimore companies and some others. It was Jewell's idea, and has been that of those who survived him, that ultimately the entire telephone system of the United States would be consolidated under one management, like the Western Union Telegraph Company. Splendid fortunes have been the result of Tyler's and Frost's early faith, it being reputed that they have easily cleared a million apiece, besides realizing very handsome dividends constantly. Of course, such tales as this set capitalists wild, especially as it is believed everywhere that telephoning is yet in its infancy.

Meeting of the New York Electrical Society.

At the last meeting of this society the subject of the influence of magnetism on compasses and watches was discussed. The President, Dr. Van de Weyde, explained the cause of the disturbances and the various processes for demagnetizing watches. The machine used for this purpose by Messrs. Giles Bros., of Chicago, was exhibited and the method of its application shown.

Mr. George W. Mansfield suggested a simple method of demagnetizing a watch which he had tried and found to be quite effective. In consists in suspending the watch from a string, and twisting the latter, so that when released the watch is rapidly revolved. If, during its rapid revolution, the watch be gradually withdrawn from the poles of a dynamo, it will be found to have lost its magnetism.

In regard to the disturbance of compass needles, a member, Mr. Joseph Wetzler, related the results of some experiments made with a view of determining the effects of local attraction caused by masses of iron. These were made in the streets of New York, and went to show that in the business portion of the city, especially in the vicinity of the elevated railroads and electric light stations, no reliance could be placed upon the readings of the needle. As an instance, it was shown that near the Edison central station the needle varied from 5 to 20 degrees from 9 A. M., when few machines were running, to 5 P. M., when all were at work.

The President also made some remarks on the localizing of faults in iron work by means of the compass needle, relating the results of an experiment which proved quite successful in determining a fault.

Remedying a Possible Danger.

BY PROF. ELIHU THOMSON.

In THE ELECTRIAL WORLD of Oct. 24th, page 171, under the title of "A Simple Remedy for a Possible Danger," you refer to a suggestion of Dr. J. A. Fleming, as meeting the danger involved in the use of secondary generators or induction coils.

Permit me to say, that this same remedy is fully described with its modifications, in my U. S. patent No. 322,138, filed April 27, 1885, and dated July 14, 1885, and that from a long line of experimenting in the direction of utilizing induction coils in electric distribution, which work was begun as far back as 1878, and before the day of incandescent lamps, I can testify to the utility of the safeguard itself, at least so far as danger occurring to a person from touching the secondary line or circuit may exist when a leak or discharge, from the primary line, takes place to it. Of course the danger of using alternating currents of high potential on the main supply line is not obviated, but such mains, I think, can be rendered comparatively safe by their inclosure underground in suitable insulating pipes or conduits which prevent access to the mains except to duly authorized persons.

The New England Telephone Company.

The directors of the New England Telephone and Telegraph Company held their regular monthly meeting in Boston on Oct. 28, President Thomas G. Sherwin in the chair, and all the members being present. Further time was granted the committee appointed at the last monthly meeting to consider the matter of a dividend. There were received reports from all parts of New England, showing that since the increase in rates had been established about 2,000 out of between 18,000 and 19,000 instruments which the company control, have been ordered out. The reports were discussed by the directors, who found reason for congratulation that fewer telephones than they anticipated had been removed. They also discussed at length the newspaper criticisms concerning the increased rates. The following financial statement of the company for August was presented :

Gross receipts	$77,366.84
Gross expenses	60,583.66
Net earnings	16,783.18
Construction	7,404.23
Net earnings over all expenses	$9,378.95

Postal Telegraph Bonds.

The case of Chester Snow *vs.* Congressman John B. Alley, in the Superior Court, at Barnstable, Mass., which occupied the whole of the week before last, ended to-day in a disagreement of the jury. This was an action concerning the conversion of 150 Postal Telegraph bonds. Snow, who has been engaged several years in prosecuting experiments in cheap and rapid telegraphy, had combined several patents and projects and had formed a company with a capital of $21,000,000, issuing $10,000,000 of bonds, when Alley was brought into the enterprise by reason of his having control of valuable patents, as well as great pecuniary means. For these considerations Snow, as he alleges, was induced to transfer to Alley and others the 150 bonds in his possession in exchange for Alley's money and interest. Snow claims that Alley failed to keep his promises to aid in making a success of the company, and that by selling his bonds at the first opportunity he decreased the value of the property. Snow seeks to recover the value of the shares transferred to Alley. Alley denies the allegations of Snow, who was, he claims, without means or credit to carry forward the enterprise, and asserts that he (Alley) obtained the bonds for finally carrying out in good faith the promise made to Snow.

New Telegraph Schemes.

Edward S. Stokes, of New York, and William King, of Minnesota, former Postmaster of the National House of Representatives, and at one time Congressman from Minnesota, are about to build a telegraph line from St. Louis to Duluth. It will be incorporated and known as the "North American Telegraph Company." The line will connect at St. Louis with the United Lines. Mr. Stokes says that the Western Union monopolizes telegraphic traffic between St. Louis and Duluth, and that his company will regulate and cheapen the traffic. He and King, he says, are practically the originators and controllers of the enterprise. Arrangements will soon be made for placing a certain amount of the stock. The estimated cost of the plant is placed at $300,000, and a portion of the construction is expected to be done this year.

Mr. Stokes has bought up the bankrupt Bankers and Merchants' telegraph plant, and he now controls the United Lines, composed of the Board of Trade lines and the Pacific and Pacific Mutual. His proposed line between St. Louis and Duluth will connect with these united lines. Mr. Stokes has just completed a line to Omaha, and when all his arrangements are completed he will have a line along the Union Pacific from Omaha to Grand Island, Neb., 250 miles south.

Success of Incandescent Lighting Companies.

The subjoined correspondence explains itself. It will be observed that the matter reached us in time for last issue. We preferred, for obvious reasons, to wait a week before publishing it :

To the Editor of The Electrical World :

SIR : We herewith inclose a copy of a letter which we sent to the *Electrical Review*. We ask you out of justice to the readers of electrical papers, to publish the same so that they might know how it is that some strange things appear in print.

We send this to you with our request for its publication because we know that there is no other electrical paper better fitted to have the matter appear.

Respectfully yours, PITTSBURGH ELECTRIC COMPANY.

PITTSBURGH, PA., Oct. 24, 1885.

To the Editor of the Electrical Review :

SIR : We have received and read your issue of to-day's date, and were very much displeased with same, so much so, in fact, that we write you for the purpose of asking you to discontinue the further sending of the journal, and to at once forward us our bill up to date. We had been subscribers to every electrical paper published up to the 1st of April last, when we discontinued all save THE ELECTRICAL WORLD and *Review*. We continued with you because we thought you were as honest in your editorial expression as THE ELECTRICAL WORLD is. We find in your issue of to-day that you are not, but that there is a want of principle about you, or else such expression is the cause of ignorance on your part. While there is not much choice of the two, for you, who claim to run a first-class independent trade paper, it certainly would be more satisfactory to your subscribers to have you acknowledge your ignorance than to allow them to reach the opinion later that your editorials are written as they are paid for, and do not represent your honest opinions.

We have particular reference to the editorial in the issue above mentioned, headed "Success of the Incandescent Lighting Companies." We read this and then found that you indorsed every system of incandescent lighting that had their card advertised in your very valuable paper. We looked over your paper several times to find the advertisement of the Edison Company, and we then came to the conclusion that since they did not pay you money for advertising, their system is much inferior to those that did. We do not blame you for working your paper for all there is in it, but as subscribers we certainly do object to having our eyes shut up by any such scheme as the one above mentioned.

Understand we do not write you at length on this matter, because of a fear on our part that the article will have any effect upon the further success of the Edison business (that will stand on its merits as it always has done), but simply to show our disgust and displeasure at the transparent and unbusiness-like method of procedure taken by you. We are convinced that all people will reach the same conclusion that we have, it only being a matter of time with them, as a disposition of this kind in trade journals is early learned by its patrons. Besides this, how much weight can be put on your other articles, when one knows how and why this one was written. No doubt those few who depend on you to shape and fix their ideas on the leading questions will be apt to feel happy when they learn of this.

We know that you know exactly the relative merits of the different systems of incandescent lighting, and know all about the life of the different make of lamps, as well as the economy and efficiency of the different systems complete. We would, therefore, very much like to hear something in your defense of this apparently unbusiness-like matter. Respectfully yours,

PITTSBURGH ELECTRIC COMPANY.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, Oct. 30, 1885.

The Bell Electric Light Company are installing an arc-light plant for Messrs. Taft, Weeden & Co., Providence. They are arranging the equipment to give from 75 to 100 arc lights. The first twenty will be in readiness for lighting this week.

The electric light plant at St. John's, N. F., was started up on Friday evening, Oct. 16, in presence of a large number of distinguished gentlemen, and everything passed off satisfactorily. The number of arc-lights placed in operation on the occasion was 75. The promoters of the enterprise have ordered from the Thomson-Houston Company an additional plant of incandescent lights, to be installed at once.

The Thomson-Houston International Electric Company has just received an order for the installation of an arc-light plant in Glasgow, Scotland.

The Plymouth Pocket Company have ordered from the Ball Electric Light Company a 25 arc-light plant, which is to be increased by 50 additional lights at an early day, for use in the neighborhood for commercial purposes.

The Edison Company for Isolated Lighting has sold a 50-light plant to Messrs. Skinner & McDavid, of Escambia, Florida.

In reply to an inquiry regarding the progress of the Sun Electric Light Company, of Woburn, Mass., the following particulars were obtained from Mr. J. R. Talbot, of the company's works at Woburn, Mass. : "In the first place, not necessarily as of the most importance, but as of the most prominence at present, I would refer to our lamp. We do not make exactly the stereotyped claims for it—that more of them can be run to the horse-power than of any other lamp—but we claim that for economy it is not excelled by any lamp that has any reasonable length of life; while for length of life we excel any lamp with which we are acquainted. Although the company is yet, comparatively speaking, young, we have made in a quiet way, and on its merits, some reputation for the lamp, and we are now making them in quantities.

"One point which we claim as an advantage over other lamps is a greater conductivity per unit of length than they possess, thus enabling us for a given resistance to obtain a greater length of light-giving filament.

"In the holder and switch the clamping jaws, giving as they do an extremely good contact, have a decided advantage over many, and at the same time there is no danger of short-circuiting in inserting or removing a lamp. The switch, although simple, is perfectly safe and effective, and the make and break is very quick, giving no chance for the forming of an arc. In the lower story of our building we are making large lamps to run on multiple series and series multiple systems with an automatic cut-out and a resistance to be switched into circuit thereby, the whole being integral with the lamp and shade or reflector. This avoids cumbrous German silver wire resistances-boxes situated at a distance. With regard to our long-distance system of incandescent work, we are scarcely as yet in a position to give such explanations as would be satisfactory and intelligible, and we therefore postpone dealing with that and two or three other matters of interest until later. Our dynamo machine, for example, we intend to have out soon. So far, we are encouraged to hope the best results from it, though until we can get ahead of other pressing work, we cannot commence to make them in any numbers."

The Jarvis Engineering Company of this city report business lively, and at the present time they are crowded with work. They have just compled erecting a steam plant for the Milford Electric Light Co., Milford, Mass. Orders are in hand for building the following stations : a six thousand incandescent light central station for the Edison Company, in this city (referred to in the preceding issue of THE ELECTRICAL WORLD); also, another station for the Edison Company, with capacity of 3,000 incandescent lights, at New Bedford, Mass., and a new station for the Electric Light Co., at Woonsocket, Mass. Orders have just been received from the Haverhill Electric Light Company, New Haven Electric Light Company, and the Brookline Electric Light Company, for an additional boiler and engine respectively ; and an order comes from the Narragansett Electric Light Company at Providence for two new boilers and three new engines. They are now at work filling an order for a complete steam plant for the Boston Conservatory of Music, which is to have the Edison system of incandescent lighting ; and they have a force at work at the following places : South Framingham, Mass.. at the works of the Para Rubber Company, putting in an additional engine to run the Brush-Swan Company's system of incandescent lighting ; Lawrence, Mass., where two engines are being placed for the plant of the Edison Company ; and at Portland, Me., another engine is being set up, and other work done, for the Consolidated Electric Light Company.

The "perfection" call bell, now being manufactured by the Boston Electric Company, is claimed to be very simple in its mechanism, and strong in its construction. Scarcely a month has passed since this bell made its appearance before the public, and no great effort has been made by the manufacturers or their agents to push the sale thereof, yet a large and growing demand for it has already been established.

Messrs. Paine & Francis, the popular and energetic New England agents of the Edison Company for isolated lighting, report a very encouraging outlook for an installation of a large number of new incandescent light plants, all within a half-a-day's journey of the "Hub."

NEW HAVEN, Oct. 31, 1885.

With the New Haven Electric Light Company business continues good. Owing to a demand for more lamps, it has been found necessary to increase the capacity of the plant from 200 to 350 arc lights.

The company has just added to the equipment of the plant as follows : Four dynamos of the Thomson-Houston make, two 50 horse-power Armington & Sims engines, and an enormous boiler with the Jarvis setting. There was a special meeting, not long since, of the stockholders of the company, for the purpose of voting upon a proposition to increase the capital stock of the company from $70,000 to $100,000, and also to change the day of the annual meeting of stockholders. The meeting was largely attended, and the officers of the company were highly complimented on the success of the plant under their management.

The affairs of the South New England Telephone Company are in a very satisfactory condition ; and it is claimed that its business has never been better than that experienced during the past three months. While it is admitted that in a number of the smaller towns and villages the exchanges are not remunerative, yet the steadily increasing demand for instruments in all the cities and larger towns throughout Southern New England will enable the company this year to make a more handsome showing of profit, over and above that of any previous year.

The office of the Baltimore & Ohio Telegraph Company recently opened on Chapel street, near Orange, is already being taxed to its utmost extent. Prior to the opening of this office, the citizens of New Haven had not enjoyed the cheap rate telegraph system. From the very day the doors were thrown open for business, there has been a steady rush of messages from morning till night. Mr. J. E. Pucci, formerly connected with the Baltimore & Ohio telegraph office in Hartford, has been appointed manager of the New Haven office.

PHILADELPHIA NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
PHILADELPHIA, Nov. 2, 1885.

Under the supervision of Superintendent Gill, the Western Union is making rapid progress with its new central office at Broad and Market streets, and it is expected that the main office will be moved there from Tenth and Chestnut streets before the first of January. The new office will be very complete in all its details.

It is now definitely understood that although the law says that all wires must be placed underground by the first of January next, nothing of the kind will occur. The committee of City Fathers which went to Chicago and other cities in search of information as to the best method of getting all the wires underground has returned, and reported that it was unable to find any system adequate to fill all the wants.

The electric railway is being pushed vigorously. The line is only an experimental one, but an expensive conduit is being laid on Ridge avenue from Dauphin street, along the outskirts of Fairmount Park to Laurel Hill Cemetery. The reason this section has been chosen is on account of the heavy grades and the irregularity of the road between these points, so that a thorough test can be made.

The construction of the road is well in hand, a large squad of men are at work, and the conduit is being put under ground at the rate of about 300 feet a day; it is thought that in about ten days the work will be finished, and it will take no time after the cons ruction of the bed to put the cars in motion, so that in about three weeks the road will be in working readiness. W. B. Schlesseger, the electrician, has charge of the operations. The cars, which will

be run by electricity, will be lighted inside by the same power as that by which they are impelled.

The construction of the road does not interfere with the horse car traffic. The shape of the conduits is the same practically as those of the Traction Company, but made of heavy timber instead of wrought iron. Running along below the surface will be the compound conductor of copper and iron, half circular in shape, well insulated and protected from any damage by outside influences. On the top of the conduit forming each side of the slot, which will have a half-inch opening, will be iron plates about five inches in breadth altogether. This slot opening will not be directly in the centre of the track, but to one side of the meridan line. The current will be transmitted by an ingenious contrivance from the conductor underground to the motor in the car, and will be under instant control of the driver or engineer. At intervals of eighteen feet plates will be arranged over the conduit, which may be readily removed for repairs and other work, and without removing the body of the conductor. The bottom of the conduit will be cemented previous to filling in the ground about it. It is claimed that a speed of from seven to ten miles an hour can be attained for the experimental line, with a saving of $2.50 to $3 per car over horse power.

For some years back, owners of private property have been daily in the habit of cutting telegraph, telephone and electric light wires that cross over their houses, acting on the Blackstonian theory that a man who owns a lot owns everything within the prescribed bounds from the centre of the earth to the sky. These people have never hesitated to cut the wires when they felt so disposed, and the courts have invariably refused to punish those who took this summary method of solving the aërial line problem. But a recent legal decision in the West, which is pronounced by our lawyers to be sound law, has created a panic among the wire-cutting fiends, and there has been less of it lately than ever before. The case in point shows that the people who cut the wires incur great responsibility, and as many people may not have seen the decision, it may be interesting to synopsize it. After the cutting of the wires, in the case spoken of, they were left lying in a confused mass in the street, which resulted in serious bodily injury to a pedestrian. He sued the careless parties, and was awarded heavy damages. Now, that establishes the principle that if the cutting of the wires is the cause of personal injury or damage to any other than the telegraph company, the person who cut them is liable. So you see that the people who cut wires and throw them in heaps in the streets lay themselves open to the law. On a dark night a man is liable to trip over them and break a limb, and in that event the person has no defense. He is guilty of negligence in having thrown dangers in the path of innocent persons. It is not the telegraph company's act which has exposed the innocent to danger, and therefore no proceedings against it will stand. Wires, whon thrown in the streets that way, are also liable to cause runaways.

Just now the Western Union and Baltimore & Ohio are in a legal snarl over the right of the latter to have the use of a Bell telephone.

The suit of the Baltimore & Ohio Telegraph Company against the Bell Telephone Company to compel the latter corporation to furnish it with a telephone in its central office, on Chestnut street, below Third, was recently before Judges Thayer, Arnold and Wilson. It was argued on behalf of the telegraph company that the telephone company was a "common carrier," like a railroad. Counsel for the telephone company claimed that, by its contract with the National Bell Telephone Company, it was agreed that telephones should not be furnished to any telegraph company other than the Western Union. In reply to this it was claimed that such a contract was illegal and void. The Court reserved its decision.

The Associated Press presents a lively scene nowadays with the operators receiving by sound and copying on the Remington type-writer, making fourteen copies of manifold in splendid style. The newspapers take kindly to the new system. The advantage of this kind of "copy" to telegraph editors is very great, as the type-written matter can be read much quicker than pen-writing, because the words are in a smaller space and a whole sentence can be taken it at a glance, as if it were regulary printed on a printing press. A great amount of time is thus saved to the editor, and when it is near the hour for going to press every minute is of great value. The men themselves seem heartily glad that the stylus has been carted off to the lumber room.

Great activity is reported by all persons here in any way engaged in electrical business. Some of the work recently done by the Thomson-Houston Company of this city is given below, and substantiates the foregoing statement. John B. Stetson's large hat factory has recently been fitted throughout with this system. The factory of E. P. & H. M. Almy has also been fitted with this system. An additional 45-light dynamo has been put in for the Lewis S. Cox Company, making in all 75 lights which the firm have of the Thomson-Houston Company's manufacture. The large works of William Sellers & Company were recently fitted with this system. They have also placed 90 additional lamps for the Northern Electric Company, and are now placing a plant at Hoboken, N. J., for the Hudson Electric Light Company. Mr. Mullen, the general manager of the company here, expects the early consummation of several contracts for isolated plants.

A. F. Congdon, a young man who was formerly connected with the Bell Telephone Company, has established himself at Seventh and Callowhill streets, where he is prepared to make estimates and do all kinds of electrical work. I believe his advertisement appears on another page of this issue.

Geo. W. Army & Co., the large belt manufacturers of this city, report trade as good, and expect soon to place on the market a new kind of belting for electric light purposes.

Alfred F. Moore, the extensive manufacturers here of insulated wire, report an increased demand for their wire, and are turning out about 5,000 lbs of wire a day. They have a new jointless lead-covered wire which is meeting with great success; as is also their new anti-induction metallic cable and new electric light wire, designed for elevators and places where the wire has motion. We were shown a very fine wire gauge here, whereby one can gauge the exact size of a wire "to the thousandth part of an inch."

The electric light is waking up the gas people at West Chester, a thriving town near Philadelphia.

Old telegraphers will regret to hear that Mr. C. Latta Laverty, of the United Press, is laid up with rheumatism, and unable to do any work. Mr. Laverty was the Master Workman of this district during the recent telegraph strike, and has always been among the foremost in electrical matters.

PITTSBURGH NOTES.

PITTSBURGH, Pa., Oct. 28, 1885.

The Allegheny County Light Company have, for the last ten days, been burning a number of lamps on Liberty street, in this city, to enable the Water Department to work at night while laying a new water main on this thoroughfare. By this means the work was done in about one half the time necessary to do it in the ordinary way. At present the company is burning a number of lamps on Fifth avenue, for the Philadelphia National Gas Company, which is extending its lines in this direction. The gas people with this help can work fully as well at night as in day time, and they can in this way get the work done before cold weather. The public has noticed this use of the new electric illuminant, and some of the papers have urged its adoption for city uses generally. The only public lamps in this city are located on the wharf For some reason the City Councils have been very slow in this direction and have just awarded a three-years' contract for gas and gasoline lighting to the Globe Gas Light Company.

The United Line Telegraph Company has just completed a Waring underground cable from its office to the Monongahela bridge, where it crosses the river on the bridge. The lines are now being erected to Wheeling, Steubenville and other points in Ohio and West Virginia.

The underground cable is the first that has been put down for telegraph purposes in the city, all the other cables being used for telephone purposes only.

There is no system of incandescent lighting in use in the city from a central station. All the lamps of this character in use here are operated from isolated plants. That such a system would pay here, there can be no doubt. The price of gas ($1 pr 1,000 ft.) would probably be somewhat of an objection to its general introduction, however; but the quality of the gas now furnished is so poor that a great many complaints are being made, and some of the present consumers would be willing to pay more for incandescent lighting than what they now pay for gas.

PITTSBURGH.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO, Nov. 2, 1885.

When in St. Louis, the latter part of last week, I found that incandescent electric lighting is being pushed there vigorously. All the leading companies are represented, and most of them have established local offices for the purpose of more thoroughly working the field. The incandescent light has already been introduced into the Custom House, *Globe-Democrat* office, Exposition Building, several of the hotels and theatres, and other prominent buildings. New isolated plants are being put in, and the central station plants are being extended as fast as the work can go forward. The electric lighting companies operating in St. Louis meet with few difficulties in the way of obstructing wire and pole ordinances, and have, consequently, a fair field. In a former letter mention was made of the rapid growth of arc lighting in St. Louis, and just at present incandescent lighting is being pushed with even more vigor than the arc. There are, probably, four thousand incandescent lamps burning nightly in St. Louis now, and the number is being rapidly increased. St. Louis seems likely to be one of the best lighted cities in the country in the near future.

The St. Louis telephone exchange, which was completely gutted by fire a short time since, was in full operation again in its new quarters when I came away. Constant and intelligent work on the cables, wires, and apparatus has at last evolved order and form out of the disorder and confusion incident to the late fire and removal to the new building on Fourth and Pine streets. The immensity of the job of putting this exchange in order again can only be appreciated by those who are acquainted with the damage a fire can do when let loose in a telephone exchange. Everything was working satisfactorily again on Friday, and Superintendent Durant's subscribers have cause for congratulation that the interruption to their service was of so short duration.

A new telegraph line from St. Louis to St. Paul is to be constructed.

William J. Kaisen, a lineman in the employ of the Baltimore & Ohio Telegraph Company, who was arrested in St. Louis last July on the charge of killing Almer E. Tong, a well-known telegraph operator, has been discharged.

The Guernsey and Scudder Electric Light Company, of 308 Locust street, St. Louis, do a rushing business, using the Excelsior apparatus. They have about 100 arc lights now running, and are expecting to increase this number soon. They are also burning a few Bernstein incandescent lamps, getting their current from the Excelsior arc dynamos.

The Fritz engines are giving more and more satisfaction to electric light people as the number put out increases. Among the late sales are the following: One to the St. Louis Calcium Light Company; one to the St. Louis Type Foundry; one to John Gooding, St. Louis, and three to H. Sblauderman, Decatur, Ill.

While in the establishment of the Shultz Belting Co., St. Louis, I was shown the advantage of their "fulled" tanned leather. By this process, as has heretofore been stated in this column, only the surfaces of the leather are tanned, the centre remaining raw-hide. A strip less than half an inch in width was almost severed with a knife from the edge of a hide tanned in this way, and although the leather was quite thin, it was almost impossible to tear the strip from the hide; while the same experiment being tried with leather tanned in the ordinary way it was easily done. This shows how strong leather tanned by the Shultz process is. Mr. Shultz makes a specialty of supplying belting for electric lighting purposes, and his belts give general satisfaction. They are strong, do not stretch, and have a soft, velvety surface, which causes them to cling closely to the pulley, and consequently renders them less liable to slip.

The Heisler Electric Works are running to their full capacity in all their departments. Mr. Heisler was a pioneer in the electrical business in St. Louis, and his installations are met with at almost every turn in that city. His works are very extensive, and at them are manufactured electric light apparatus, carbons, electric bells, annunciators, burglar alarms, etc.

The Franklin Electric Works, Rose & Rein, proprietors, devote considerable attention to special manufacturing and private line telephones.

The Parker-Russell Mining and Manufacturing Co., makers of the well-known "sun-light" carbons, find their business increasing and their carbons meeting with more and more favor. This company has been in the carbon business a comparatively short time only, but has already built up a trade of nearly a hundred thousand carbons a week.

The towns of Clinton and Lyons, Iowa, are talking of introducing the electric light. As gas is $3.80 per thousand in the former city, this would seem to be an opportunity for the electric light there.

According to the dispatches the decision of the Indiana court in regard to the law limiting telephone rentals to three dollars a month is against the company.

The system (Oram's patent, I believe) by which the correct time can be taken by subscribers from the telephone at will, is to be introduced by the telephone company in Chicago, the time, which will be obtained direct from Washington, to be furnished by Giles Bros. & Co., the popular jewelers.

The gas people never lose an opportunity. In Terre Haute, Ind., they are endeavoring to get out an injunction to prevent the council from executing a contract with an electric light company.

A late issue of the *Chicago Times* has the following rather rosy description of the experiment mentioned. The article did not have "adv." after it, but nevertheless it read like paid matter:

"THE LATEST MIRACLE OF ELECTRICAL SCIENCE—AN ACHIEVEMENT THAT AMERICA CAN BE PROUD OF.

"The expedition to Aurora yesterday of a party of city officials, professional electricians, press reporters, and prominent capitalists, to investigate through a forty-two-mile trial wire the possibilities for carrying human eyesight unlimited distances, or as Brewster, the English electric scientist, puts it, 'ultimately enabling us to see from London bridge the elevators and church steeples of Chicago,' was an event of absorbing interest to those present. This latest scientific episode in Western history marks an era in electrical advancement. The run to Aurora was made in good time, and the arrival of such a body of professional people in that thriving city created a great deal of curiosity. At the proper time the new appliance was attached to the electric conductor furnished for that purpose, and each member of the expedition in turn not only distinguished the outlines of the city hall, post office, etc., upon the proper adjustment of the Chicago terminal instrument, but was enabled also, upon careful location of the appliance with the right degree of light, to outline different commercial edifices and even to command at that distance a clear vision of interior apartments, shelves, merchandise, etc. At the handsome, brilliantly-lighted establishment of Giles Brothers, on State street, the terminal batteries were transferred, for the purpose of seeing how effective this method was. It was thought that this test, if successful, would prove beyond any cavil the merits of this new invention. There was some slight degree of magnetism in the delicately constructed receiver or retina at the Chicago end of the wire, which to some extent interfered with a clear outline. Acting upon the suggestion of Mr. Giles, the attachment which has been so signally successful in preventing the magnetism of watches—the Giles anti-magnetic watch case—was placed in the circuit, and this magnetism or induction was entirely eradicated.

"The rainbow-tinted lights disintegrated by the prism of the precious stones were dazzling; the group of large diamonds which were placed near the retina of the instrument looked as if a dozens suns were brought down to a microscopical point. The enthusiasm of the investigating party reached such an extent that a purchase was made of two fine solitaires by one of the wealthier visitors as a memento of the occasion. When remonstrated with for purchasing such valuable property in this apparently careless way, he replied: 'You heard what the salesman said about the purity and worth of these stones; well, Giles Brothers always stand behind to back up such assertions.'

"When the instrument was turned on the diamond-cutting departments, the rapid movements of the machinery and flashing and dancing of the forming angles of these precious stones prevented any distinct lines being seen. This was finally obviated by the use of the anti-magnetic disintegrator, which brought these lines to a focus, rendering their observation a matter of comparative ease.

"In summing up, the verdict from both the professional electricians and the capitalists present was that the experiment was most successful, and barring a few minor defects, which will will undoubtedly soon be remedied, its commercial value cannot be overestimated."

THE TELEGRAPH.

T. M. B. A.—Assessment No. 192 is for $1, and covers the death claims of C. C. Brown, James C. Platt, and Irving S. Fitch.

A Sad Accident.—Arthur S. Parks, telegraph operator at Russell on the Boston & Albany Railroad, fell against a passing freight train Friday afternoon last and died soon after from his injuries.

Shut Up at Last.—The Union Electric Telegraph Company, of Cincinnati, that for some time has been robbing young men and women of their money on pretense of teaching telegraphy, and securing them situations "on their lines," which have no existence, is in a state of collapse. The sheriff is in possession of the establishment under attachment issued against it by parties defrauded, and its president, H. C. Roeth, is out of the city. He is not likely to return to Cincinnati.

THE TELEPHONE.

Cool We Are!—THE ELECTRICAL WORLD has something to say about a new galvanic cell. Keep cool, my boy! it's not a new telephone company.—*Lowell Citizen.*

Stock Distribution.—It is announced that the International Bell and Tropical American telephone stock belonging to Continental Telephone Company stockholders are ready for distribution at 95 Milk street on the basis of 25 shares of Tropical and two shares of International for every five shares of Continental.

International.—It is reported that the International Bell Telephone Company (Limited) has the money for another 2½ per cent. dividend in January. This company

operates in Europe. In its financial statement of June 18 the company expressed confidence in its ability to pay 5 per cent. on its capital, or $1,387,000 in 1885, and the above report is in accord with this expectation.

An Aid to Memory.—This conversation actually occurred at the Central Hotel, Cherry Valley:

Man—Is there a telephone here?

Operator—Yes, sir.

Man—Can I send a message to Little Falls?

Operator—Certainly. To whom do you wish to send?

Man—I've forgotten the man's name; that's what I want to telephone for.—*Albany Journal.*

Humane and Ingenious.—Mr. W. P. Booth, manager of the Rockford, Ill., telephone exchange, has invented a neat little apparatus for the convenience of operators. It is an adjustable transmitter holder, designed to accommodate a long or short operator at the same telephone, or for an operator seated in a chair or standing up. By an easy adjustment the holder can be raised or lowered or turned in any direction freely, and without interfering with its efficiency. It is an ingenious little invention. This gentleman is the son of Mr. N. M. Booth, the energetic electric light representative of Evansville, Ind.

Suggestive.—The fact is that a telephone does not disguise a voice at all. It simply accents its prevailing quality, making it rather more recognizable, if possible. A person who has a sharp ring in the voice will speak more sharply, a gruff voice will be more gruff, and, by the same rule, an insincere voice ought to be more insincere. The telephone, indeed, if a little more leisure could be given to the people who talk through it, instead of the feeling that the central office is waiting impatiently to cut them off, would give fine opportunity for weighing a man's words unperturbed by the actual presence.—*Philadelphia Ledger.*

Common Carriers.—Another judicial decision has been rendered, in which a telephone company is considered as a common carrier and liable to all legal provisions applicable to common carriers. The case came up in Evansville, Ind., where the Bell Telephone Company had refused to furnish telephones upon applications made by merchants there, with whom the agents of the company are not on good terms. Judge Garrett has decided that this is not just ground for refusal; that the telephone company is bound by the laws governing common carriers to make no discrimination between the different applicants.

To Offset "Central's" Perversity.—"I have a new scheme to spread the Gospel," said an evangelist to a reporter lately. "You know all sorts of people use the telephone, and doubtless you have observed the unsaintly frame of temper most of them fall into during the interval from 'Hello' to 'Hello.' Wel', I'm going to form a society whose purpose shall be to chain a free Bible to every telephone in the country. This will give the telephoners something to read while waiting for a response, and so diminish profanity by increasing tranquillity. The result will be such a crop of Scriptural knowledge as has not been garnered in years."

Erie Stock.—Erie is the most desirable of the telephone stocks, and should witness a considerable advance above yesterday's closing quotations of 25¼ within the next five or six weeks. Another quarterly dividend will be declared upon Erie before the last of December, and might be ¼ per cent., since the company is earning 3¼ per cent. But it will be wisest for the directors to make the quarterly dividend only ¼ of 1 per cent. for the present. This dividend of 50c. per quarter, or $2 per annum, is equivalent to nearly 8 per cent. upon the present selling price of the stock. Erie telephone is one of the great bull cards of the future. —*Boston Commercial Bulletin.*

Tropical Finances.—The financial exhibit of the Tropical American Telephone Company, Oct. 1, is:

Quick assets.	
Cash on hand	$9,957.84
Due from sub-companies	19,801.36
Furniture	375.00
Notes receivable	2,800.00
Total	$32,934.20
Debts.	
Accounts payable	$4,219.58
Due West India Company	582.15
Total	$4,801.73
Excess quick assets Oct. 1	28,132.47

The Bell Patent Fight.—A dispatch from Washington of Oct. 31 says: A large number of patent attorneys and other persons interested in the telephone cases were in attendance at the Interior Department to-day to hear the beginning of the arguments on the application of the Pan-Electric, the Globe and the Washington Telephone Company to have the United States begin suit to cancel the Bell patent. Mr. Mongtomery, the Assistant Attorney General, had declined to take any part in the proceedings owing to his personal relations to one of the parties in interest, so the hearing was conducted by Secretary Lamar, Commissioner of Patents Montgomery, and Assistant Secretary Jenks. Alexander Graham Bell sat beside his counsel, Mr. Storrow, of Boston. Quite a discussion took place as to the scope of the investigation and the legal points that must be discussed. Secretary Lamar finally said that he had no power over the Patent Office, and the question at issue in his opinion was simply whether he should advise the Attorney General to bring suit to cancel the Bell patent or set it aside. That was a matter he should like to hear argued, and an adjournment was had to Monday, Nov. 9.

Strong Language.—The coming legislative season will see a new and organized appeal to the Legislatures to take down the arrogance and greed of the American Bell, and that appeal will not go unheeded. As a common carrier, the telephone business is unquestionably subject to State regulation and control. That regulation may be exercised through any authority the State may name, and we believe that the Railroad Commission, as the supervisors of our principal common carrying business, should have its functions extended to cover the telephone interest. The local companies are quite as vitally interested as their patrons in having such legislation enacted, since no enterprise can hope to succeed by a policy which necessarily reduces the field of its utility and disgusts those patrons whom it retains. The power of the State alone can loosen the grip of the American Bell upon the throats of its subsidiary companies, unless, as is by no means impossible the invalidity of the Bell patent should be established by the United States courts. The Department of Justice has referred to the Department of the Interior the application for a suit against the Bell which recently gave rise to so much comment. When Mr. Lamar reports, it will be more clearly established whether or not there is ground for a suit.—*Springfield, Mass., Republican.*

THE ELECTRIC LIGHT.

Pleased With It.—The electric light recently introduced at L. B. Southwick & Co.'s factory in Peabody is giving such good satisfaction that several other firms are contemplating a similar method of lighting.

More for the Bridge.—Travel on the Brooklyn Bridge has grown so much that more electric lights are needed for the new approaches and exits. Another 10-light dynamo has been ordered and a 16 horse-power engine.

Fostoria, O.—The parties who purchased a 30-light Brush plant at Fostoria, O., are now running wires, and expect to start up this week, doing a general lighting station business, supplying both arc and incandescent light.

Penn Yan, N. Y.—The Excelsior Electric Company, of Penn Yan, is running 30 Excelsior lamps very successfully, and will light up Canandaigua in a few days. Mr. W. A. Giles, the superintendent, is an efficient, hard-working and deserving young electrician.

Price of Carbon Points.—A conference of the manufacturers of carbon points was held at Cleveland on Thursday last for the purpose of effecting a combination to uphold prices. The estimate is that there are now about 200,000 carbon points used daily in this country.

To Rebuild Their Works.—The Forest City Carbon Manufacturing Company, of Cleveland, O., have already begun to rebuild their works, which were partially destroyed by fire on the night of October 18. They expect to be in operation by this time, and are anxious to do so, their books being crowded with orders to be filled.

Consolidated Company's Trustees.—The following gentlemen have been elected trustees of the Consolidated Electric Light Company for the ensuing year: Charles H. Banes, Edwin S. Thayer, Henry C. Davis, Amos Broadnax, Albon Man, L. B. Ward, Thomas Wallace, Jacob Hays, C. A. Coffin, W. C. Andrews, John Rooney, Thomas C. Platt, and H. R. Garden.

For the South.—The Texas Electric Illuminating Company, of Dallas, Tex., is prepared to undertake all kinds of electric light installations, to furnish machines for electro-plating and electro-power service, and to act as practical mechanical and electrical engineers. They will make estimates on any plant required, and will give prompt attention to all correspondence.

Dayton, O.—The Dayton (Ohio) Electric Light Company claim to have a circuit 10½ miles long, with 40 arc lamps on it. The United States Company have contracted for a 2,000-light incandescent central station in Dayton. The local company insist, however, on having it installed on the three-wire system, which system has heretofore been used only by the Edison Company.

On the Cars.—It is proposed to fit up a sleeping car with incandescent lamps, run by the "patented chemical batteries" of the Chemical Electric Light and Power Company, and to light it continuously for three or four weeks without renewing the chemical solution. Arrangements are being made to manufacture the solution for use in every sort of battery now using bichromate of potash.

The Light for the West.—The electric light is surely the coming light. Denver has awarded the contract of lighting the city to the electric light company, and the gas company will be compelled to depend on private consumption for support. Other towns are also figuring for electric plants for light purposes. Durango, Silverton and Greeley are foremost in agitating the matter.—*Dillon (Col.) Enterprise.*

Quite So.—Most unjust and injudicious is the *Scientific American's* attack upon electric lighting companies, in its issue of October 10. That it virtually pronounces a swindle an important industry which, for a heavy consideration, it has heretofore promoted in its columns, looks a little queer. Perhaps, after all, THE ELECTRICAL WORLD's point that the columns of the *Scientific American* do not *now* contain a single electric lighting advertisement may account for the milk in the cocoanut.—*Iron Trade Review.*

Portland, Me.—The Consolidated Electric Light Company, Portland, Me., have put in the fourth Armington & Sims engine. They have started their "municipal system" with perfect success, having run thirty-eight miles of wires to the different lamp-posts. They have utilized the old posts, but have added three feet to the height by inserting an iron extension into the old socket. This system will eventually drive all gas and naphtha lights from the streets, as it can be sold at the same price and pay a large profit.

Busy.—The equipment of the American Electric Manufacturing Company's new factory was completed last week, and will be in full operation this week, with advance orders on hand for dynamo machines and lamps sufficient to keep it running from four to six months. The company is so crowded with orders for apparatus that it has given an order to the Electrical Development and Manufacturing Company, of Boston, to manufacture 1,000 standard lamps, and President Goff states that this would probably be followed with an order for 5,000 more in a few days.

Greeley, Col.—The Greeley Electric Light Company are about to put in a plant of 600 Brush-Swan incandescent lights, and have placed their entire contract for steam and motive power with the Pond Engineering Company, of St. Louis. The order includes two 42 horse-power Armington & Sims' engines, two 50 horse-power steel boilers, one Lowe feed-water heater, and one Blake boiler-feed pump, of 100 horse-power capacity each; also foundation boxes, belting, etc. The Pond Engineering Company are making a specialty of fitting up electric light stations, and report numerous orders on their books.

A New Combination.—The American Electric Manufacturing Company, of this city, has just closed a contract with Sheridan S. Badger, of Chicago, by which he associates himself with that company as Western manager, and establishes a branch of the same in Chicago. He turns over to the American company his two Chicago companies of 300 lights each, and companies in Keokuk, Ia., Racine, Wis., and Joliet, Ill.; also a contract for a 600-light plant in Milwaukee, Wis., and other contracts and franchises aggregating almost 2,000 lights at the start. Mr. Badger has been in business in the West several years, and is said to be one of the most enterprising and successful electric light managers in that section.

Electric Lights at Raleigh, N. C.—Mr. C. M. McNett, agent for the Thomson-Houston Electric Company, of Boston, Mass., received from the Mayor and Board of Aldermen of Raleigh, N. C., Oct. 14, the exclusive right for three years to locate poles and run electric light wires through such streets as he desired. He has also secured the lighting of the State Capitol and all the principal business houses. On the 22d a stock company was organized, with a capital of $3,000, under the laws of North Carolina, and with the name of the Thomson-Houston Electric Company of Raleigh, N. C., with the following officers: R. T. Gray, President; Julius Lewis, Vice-President; G. E. Leach, Secretary and Treasurer; Directors—Rufus S. Tucker, E. R. Stanps, C. M. McNett, M. T. Leach, R. T. Gray, G. E. Leach, Julius Lewis. Machinery has been ordered, and the work is progressing rapidly.

Patent Litigation.—The case of the Consolidated Electric Light Company against the Edison Electric Light Company, to restrain the latter from using fibrous filaments for carbons in incandescent electric lamps, came up on demurrer before Judge Wallace, in the United States Circuit Court, on Oct. 29. Last spring a patent for the use of the filaments was obtained after a long fight by the Consolidated people. Senator Evarts, who with J. M. Tomlinson appeared for the Edison Company now argues that the patent was not valid, as it had been issued by the Commissioner of Patents to the Electro-Dynamo Company, the assignors of the Consolidated Electric Light Company, and not directly to the Consolidated Company. For the plaintiff appeared E. N. Dickerson, H. R. Garden and Amos Broadnax. Mr. Dickerson argued that the patent was valid. It was the old Sawyer-Man patent, and it was assigned to the Electro-Dynamo Company, and by this company in turn to the Consolidated Electric Company. The patent when granted was given to the Electro-Dynamo Company "or its assigns or successors." Mr. Dickerson cited authorities to show that patents issued in the same form had been held valid. Judge Wallace took the papers and reserved his decision on the demurrer.

MISCELLANEOUS NOTES.

A Good Idea.—The senior electrical engineers of the Massachusetts Institute of Technology have formed a society, with the professor at the head, for reading and discussing articles on electricity, as relating to engineering, etc., which appear from time to time in THE ELECTRICAL WORLD and other scientific papers. Each student in turn prepares an abstract, which is read and discussed. Meetings are held each week.

Bleaching Fibres.—Cotton manufacturers in St. Petersburg are much interested at present in the successful application of electricity for the purpose of bleaching cotton and flax fibres as well as tissues. The material is steeped in water, which is then decomposed by electricity, the oxygen which is thus set free at once acting on the fibres. This process has been found to occupy very considerably less time than the ordinary one.

Grant Fund.—Among the recent contributions to the Grant Monument Fund were the following, received through the Western Union Telegraph Company, from 700 subscribers, residents of the principal cities and towns in the following States and Territories: Iowa, Minnesota, California, Connecticut, New York, New Jersey, West Virginia, Ohio, Kentucky, Pennsylvania, Kansas, Colorado, New Mexico, Illinois, Indiana, Michigan, Alabama, Idaho, Dakota Territory, Wisconsin, Mississippi, Washington Territory and Maine. These include a subscription from Gov. L. P. Hauser, of Montana, of $100; $765.60.

Electricity in the Operating-Room.—At Guy's Hospital, London, both surgeries and the operating-theatre are now connected direct with the electrifying-room, so the surgeon may have the current at his disposal at any time when he may require it. He presses a small stud, which rings a bell in the electrician's room, and points out on an indicator where the current is required. The latter is then turned on without loss of time. At night, the operator can obtain the current by a simple movement of a spring, the indicating apparatus in the battery-room registering the fact, and also betraying the negligence of the operator if the current is not turned "off" when not required. The arrangements are complete and work satisfactorily, and it is contemplated carrying them out into the medical wards, so as to avoid the necessity for shifting batteries to that part of the hospital where the current is required.

PERSONALS.

Pratt—Easter.—The many friends of Mr. Robert James Pratt will be glad to hear of the marriage of that gentleman on Oct. 28 to Miss Sarah Haviland, daughter of Mr. and Mrs. Hamilton Easter, of Baltimore County, Maryland.

Ezra T. Gilliland has been visiting Indianapolis recently, and has received a hearty welcome there as a man prominently connected with the development of the telephone. "Nearly every piece of the mechanical apparatus used in operating the telephone bears the imprint of his mind and hand, without which telephony would not be the annihilator of time and space that it is."

Kelly—Kennedy.—A charming wedding was celebrated in Hoboken, N. J., on Tuesday, Oct. 26. Mr. James F. Kelly, the electrician of the Electrical Supply Company, was married by the Rev. P. Corrigan, to Miss Julia Kennedy, daughter of the late John Kennedy, for many years County Clerk of Hudson County. After the ceremony at the church, the young couple held a reception at the residence of the bride's sister, Mrs. Rohder, only the relatives of the contracting parties being present.—*New York Sunday Times.*

Professor Bell's Sealed Packet.—On being asked a day or two ago as to the possibility of seeing long dis-

ances by means of electricity, Professor Bell replied: "That is a question which is now being asked on all sides, one which I can answer affirmatively. I cannot tell how soon. I only know that the problem is so nearly solved as to encourage investigators to persevere a little longer. I know of at least a half dozen men at work on the subject. The reason why I know is amusing. Several years ago I was experimenting with the problem of the photophone. As you may remember, a ray of light from the sun was the motive power, and selenium the important feature of its construction. When I had solved this problem I deposited a description of my discovery in the Smithsonian Institution without giving any information to the authorities as to what the sealed packet contained. Some persons began to speculate as to the probable nature of the discovery hidden in the packet. Not long afterward, the London *Nature* stated in a paragraph that I had solved the problem of seeing long distances, and that full particulars of the discovery were contained in a sealed packet deposited in the Smithsonian Institution. Instantly six investigators rushed into print in their respective localities to say that they had already solved the problem, and protesting against my alleged assumption of priority. In New York a Mr. Sawyer wrote, claiming the invention. The sealed packet became an object of tender solicitude. I had at that time never given any attention to the subject. Although the indignant six claimed the invention, no one has yet ever seen any one else at long distances, nor has any instrument been exhibited which looks like solving the problem. I think I can say, however, that it will not be long before you can seem to sit in the room and converse with your friend far away, yet automatically by your side."

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Am. Dist., b 26, a 28½; Am. Cable, b 69½, a 70; B. & M., b 2; Western Union, b 80, a 80¼.

Telephone.—Am. Bell, b 179, a 181; Erie, b 26½; New England, b 29, a 30.

Electric Light.—No new quotations.

BUSINESS NOTICES.

Anti-Magnetic Shields for Watches.—These shields, made by Giles, Brother & Co., State and Washington streets, Chicago, are an efficient protection to the works of watches from magnetism, as many testimonials in their possession show. This firm also demagnetize watches that are already affected. The Eastern Agent is W. A. Wales, 16 Maiden lane, New York.

A Cable-Clip Compliment.—The Providence Telephone Company has in use 10,000 of the Wright Cable Clip, and Mr. A. C. White, superintendent of the company, says: "We consider them the best in the market. This company will use no other."

Card from the United States Electric Lighting Company.—Special attention is called to the foot-note of the Edison Company's advertisement, which has been running since August 15 in this paper, in which they give us a gratuitous notice in their conspicuous attempt to mislead the public. The Chicago *Times* of August 9 read as follows: "The last statement issued by the United States Electric Lighting Company develops the fact that during the past year over **53,100** incandescent lights were installed or contracted for by that company, instead of 3,100, as stated in yesterday's *Times*." The Edison Company seem to be clutching at treacherous straws.

Dean's Rheumatic Pills
Are a sure cure, a superior remedy, almost infallible; 50c.
HALE'S HONEY, the great cough cure, 25c., 50c. and $1.
GLENN'S SULPHUR SOAP heals and beautifies the skin; 25c.
GERMAN CORN REMOVER kills corns and bunions; 25c.
HILL'S HAIR AND WHISKER DYE, black and brown, 50c.
PIKE'S TOOTHACHE DROPS will cure in one minute; 25c.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED OCTOBER 20, 1885.

Printing Telegraph; Charles N. Judson, Brooklyn, N. Y 328,491

The letter-types on the type-wheel are always inked by the roller *C*, carrying ink of one color, and the figure-types by the rollers *B*, carrying ink of another color, and thus the impression upon the paper by the letter-types is always of one color, while that of the figure-types is always of another color.

He claims, among other features, the combination, with one type-wheel, of two inking-rollers having different-colored inks and means for applying said rollers, respectively, to designated characters upon said wheel.

Floating Current Motor; William Main, Brooklyn, N. Y., Assignor to the River and Rail Electric Light Co., W. Va.....(1) 328,496; (2) 328,497

1. Consists of endless chains carrying floats with three sets of sprocket wheels for said chains, the middle set being placed out of aligment with and on the opposite side of the operating current from the other two, whereby the floats are made to take oblique paths through the water.

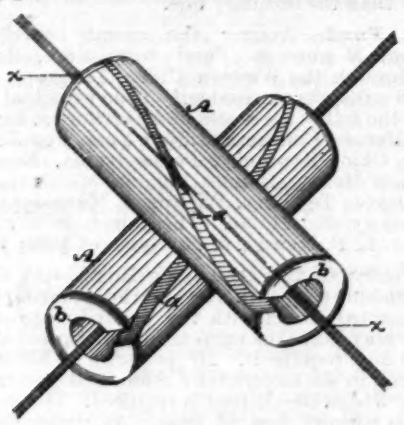
2. The claims cover modifications and improvements relating to the former patent.

Printing Telegraph; William J. McClausland, Philadelphia, Pa..... 328,500

Consists in certain improvements upon letters patent granted to him June 3, 1884, and numbered 299,664, principally relating to the device for overcoming the dead-centres and the printing mechanism.

Apparatus for Separating Gold from Ores; William J. Tanner, London, Eng..... 328,532

It is well known that when amalgam plates are used for collecting gold and silver from their ores, the surfaces of



328,728. INSULATOR.

these plates are liable to become tarnished or sickened by certain substances contained in the ores or in the current of water which is employed to carry the water over the plates, and that in this condition they are unfitted for amalgamating the particles of gold and silver. To prevent this and to keep the surfaces of the amalgam plates always bright and in a better condition for catching and amalgamating the particles of gold and silver, electricity is employed.

Electric Governor for Water Wheels; Edward H Amet, Chicago, Ill., Assignor to Herbert A. Streeter, same place..... 328,556

The water-wheel furnishes the power to drive a dynamo for the purpose of generating electricity in an electric-lighting system, and the purpose in view is to proportion the supply of water to the strength of the current generated by the dynamo.

Consists of power-conveying devices for opening and closing the water gate, comprising belts and a belt-shifter, a lever carrying an armature, an electro-magnet operating with said armature and gearing intermediate the belt-shifter and armatured lever for operating said shifter, and a solenoid, the core of which is connected with a secondary lever arranged with the said armatured lever.

Commutator for Dynamo-Electric Machines; Thomas A. Edison, Menlo Park, N. J..... 328,572

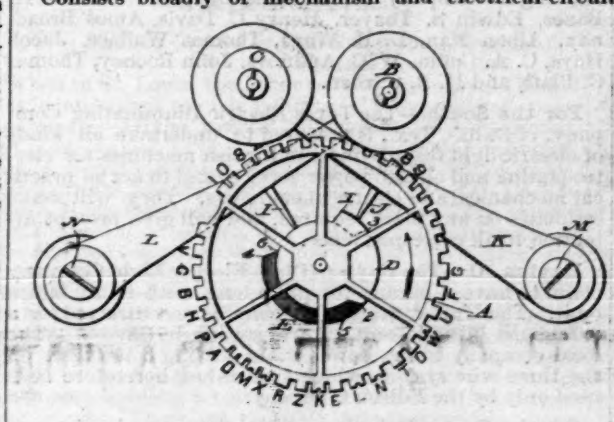
The electrical pieces for connecting the commutator segments with the armature coils are removable.

System of Electric Lighting; Thomas A. Edison, Menlo Park, N. J.....(1) 328,573, (2) 328,574, (3) 228,575

The general object of these inventions is the employment in an effectual manner of high tension current for incandescent electric lamps. They all are applications or modifications of his three-wire system. The first consists, as shown, of automatic cut-out mechanisms for the several separate lamps (including a localizing constantly-closed shunt around each lamp), maintaining the continuity of the circuit as the incandescing conductors of the lamps break. The remaining two patents include different classes of claims for substantially the same disposition.

Electric Signal Apparatus; Isaiah H. Farnham, Deering, Me., Assignor to the American Bell Telephone Co., Boston, Mass..... 328,578

Consists broadly of mechanism and electrical-circuit



328,491. PRINTING TELEGRAPH.

arrangement whereby different modes of operating the same signal-transmitting apparatus at the central station are enabled to effectuate results differing in character at the sub-stations.

Electrical Perforator; James E. Munson, New York, N. Y..... 328,600

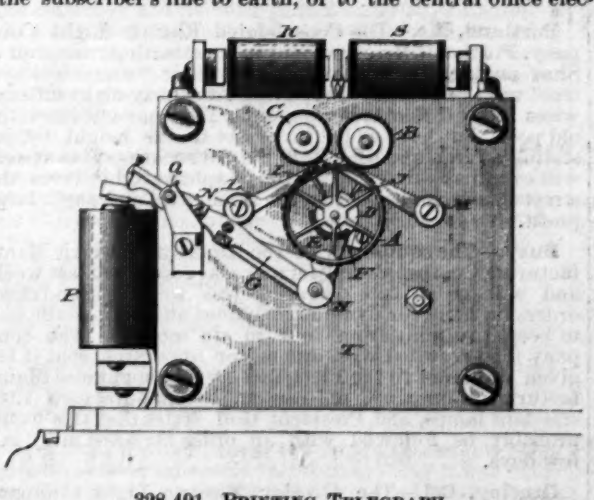
A pattern-strip perforated with the message controls and operates punches that reproduce the message at the distant receiving-station. The distance between the perforations may vary on the pattern-strip, but said perforations are reproduced at the receiving-station regularly spaced.

Liquid for Voltaic Batteries; August F. W. Partz, Philadelphia, Pa..... 328,607

Consists of a compound solution of ammonic chloride and potassic bichromate; the anode being zinc and the cathode carbon.

Telephone Switchboard; Carl C. Soune, Shanghai, China..... 328,618

Consists in annunciator drops automatically connecting the subscriber's line to earth, or to the central office elec-



328,491. PRINTING TELEGRAPH.

tric generator, or to the telephonic instrument in contact plugs in which the subscriber's line ends automatically; connecting the subscriber's line to earth when not in use; and in a switchboard being divided into sections in case the number of subscribers is unusually large.

Electric Battery; Theodore S. Kauffer, Boston, Assignor to W. B. H. Downes, trustee, Newton, Mass..... 328,687

He has a claim upon the mixture of bichromate of soda and an acid, preferably sulphuric. The bichromate is alleged to be very soluble, so that crystals are seldom formed.

Electric Switch; Samuel S. Leonard, Minneapolis, Minn., Assignor of one-half to the Minnesota Brush Electric Co., same place..... 328,695

The switch has plates secured to a revolving head, whereby the electric current may be conveyed through said plates to and from the lamp or lamps, said revolving head being seated upon pivoted heads or plates located between it and the base plate.

Telephonic Appliances; James F. McLaughlin, Philadelphia, Pa..... (1) 328,702, (2) 328,703

1. Relates to electric telephonic appliances of that form which has a permanent magnet common to the telephone and the call-bell.

The permanent magnet has pole-piece extensions provided with a helix diaphragm and a mouth-piece. A flexible tube is provided for the mouth-piece.

2. Its object is to provide means for preventing undue rattling. A carbon block presses upon the diaphragm opposite the tension regulator.

Underground Conduit for Electric Wires; George B. Pennock, Philadelphia, Pa..... 328,712

Consists of a compound conduit in which the telephone wires are insulated as to sound and electricity and the telegraph wires as to electricity.

Insulator; Leonard O. Smith, Philadelphia, Pa.... 328,728

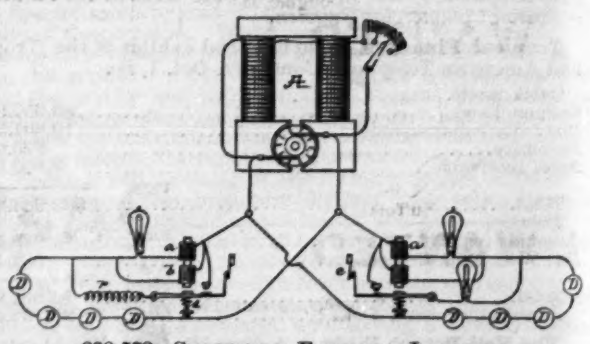
It is adapted for supporting cross wires. The pieces *A* have their ends free, as shown in the cut.

Electric Clock; Frank R. Field, Greenfield, Mass. 328,769

The pendulum controls the circuit of an electro-magnet, which in turn actuates a device by which impulses are given to the pendulum.

Electric Railway System; Frank J. Sprague, New York, N. Y..... 328,821

It is adapted for two tracks, and consists of two sets of working-conductors, one set for each track, a common



328,573. SYSTEM OF ELECTRIC LIGHTING.

source of supply for said sets, and two or more motors connected with each set in parallel circuit with each other.

Electric Belt; Paul Wenigmann, Chicago, Ill., Assignor to William D. Clark, same place..... 328,829

Relates to improvements in that class of voltaic electric belts employed as a medicinal agent. Consists of a number of minute batteries of cylindrical shape, insulating caps or buttons in the ends of the cylinders and suitable electrical and flexible connections.

1. Incandescent Electric Lamp Switch. 2. Automatic Switch-Board for Electric Lamps; Craig R. Arnold, Philadelphia, Pa..(1) 328,831; (2) 328,832

1. Consists of two fixed split or doubled jaw contact-points and a rotary switch so arranged that it makes and breaks circuit without producing undue sparking.

2. Consists of details of construction, whereby the gravity of the lamp when placed upon the switch-board moves its contact or spring-fingers to complete or switch the line-circuit through the lamp.

Commutator for Dynamo-Electric Machines; C. E. Piper, Moline, Ill..... 328,859

Consists in a cylinder with the metallic surfaces insulated from each other transversely, all the metallic sections on each side of the transverse division being electrically connected with all the other sections on the same side and with the armature-coils, while the different metallic sections in each transverse division are separated from each other upon the surface by sections of hard rubber or other insulating material.

Copies of the specifications and drawings complete of any of the patents mentioned in this record—or of any other patent issued since 1866—can be had from this office for 25 cents. Please give date and number of patent desired, and address Johnston's Patent Agency, 9 Murray st., New York.